Chemical Week

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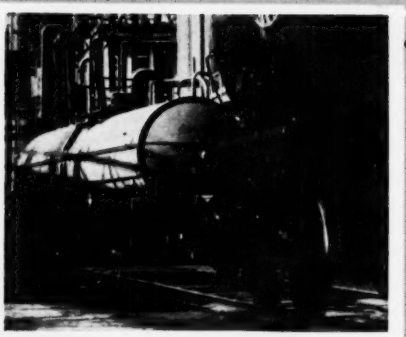

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Chemical Week

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January 26, 1952

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OPINION . . . . .

When Did it Start?

To THE EDITOR: We would draw your attention to two misstatements in the article "Bottle Ammonia" which appeared in the Dec. 29 issue of CHEMICAL WEEK. These are: (1) "Since a successful method for applying ammonia directly to the soil was developed in 1947 . . . ." (2) "Prior to 1947, the application of ammonia to the soil as a fertilizer had been attempted many times, but with little success. Now it is used in some 23 states, mostly in the South and Southwest."

Actually, the injection of ammonia into the soil was a successful commercial practice in California commencing in 1941. Shell Chemical Corp. was the first to develop the commercial techniques used today.

In California, in 1934 . . . ammonia was first commercially applied and distributed as a fertilizer through irrigation water. In 1938, development work on the *injection* of ammonia directly into the soil was completed and in 1941, in California, the first commercial—and successful—injection of ammonia into the soil occurred.

World War II forced diversion of agricultural ammonia into munitions and other military uses, but in 1943, ammonia again was available for agricultural use, and application to the soil by injection and irrigation was resumed on a commercial basis. Since then, the use of anhydrous ammonia has been standard practice in Far Western states, from which it has spread to the South and the Midwest. . . .

J. P. OKIE
Manager
Industrial Chemicals Dept.
Shell Chemical Corp.
New York, N.Y.

CW should have made it clear that Shell did indeed pioneer ammonia injection well before 1947. The greatest commercial impetus, however, has come since that time. We are grateful to Reader Okie for clarifying these points.—ED.

How Many People?

To THE EDITOR: In the December 22, 1951, issue of CHEMICAL WEEK there was an item . . . concerning fluoridation of community water supplies. There were some statistics presented by you which strove to show the extent of fluoridation of public drinking water supplies in the United States. While these statistics are no doubt correct, for they obviously emanated from the office of Dr. John Knutson of the United States Public Health Service, they do not give the reader an accurate picture of the number of people actually drinking fluoridated water.

This article . . . presented biased data in that it failed to depict the true extent to which fluoridation has progressed in the United States. I believe that a more representative and certainly a more accurate picture of current fluoridation in the United States would have been accomplished by showing the total population affected, that is, the number of people in the various geographical areas actually being served by fluoridated drinking water supplies . . .

N. E. SCHEU
Sales Department
General Chemical Division
San Francisco, Calif.

CW did not purport to give a progress report on fluoridation, grants Reader Scheu that a more representative and certainly more accurate picture of fluoridation would be in the population percentage.—ED.

Paleophile

To THE EDITOR: Do you really take "Krilium" ("Creeping Up On Nature," Jan. 5) for a progress? "Improvers" like this will contribute to an even more rapid rate of soil depletion and human decline. Nature does not know of substitutes, but most chemists don't know nature. They are accustomed to think in fragments only and to fight against the symptoms rather than the cause.

"Krilium" will succeed in further fogging genuine natural requirements, i.e., organic soil treatment and manuring. These are the means which are able to give the lie to Malthus, not chemicals.

This lie has long since been given by nature and by those who fostered her methods: The Shantung district in China where chemicals are unknown, in nearly the same latitude as St. Louis, with the same area as Wisconsin, supports a sixteen times as large population as Wisconsin and has even 25% less rainfall. All this since a time tenfold that of the entire American history and without any machinery to assist nature. It is here that you may improve: Use natural methods, return everything to the soil instead of wasting and dumping it into the waterways, and employ machinery for this purpose.

Only the fact—besides many others—that "Krilium" will not be attacked

OPINION . . . . . .

by bacteria should give you to think. Humus is eaten by bacteria; this is nature's old established system to which soil and plants are adapted.

If this generation wants to avoid to be cursed by their descendants, if the Monsanto gentlemen want to render a genuine service to mankind, they should burn their papers, forget the whole thing and better take the trouble to learn to understand nature, to learn that agriculture is a little more than a way to fill the contemporaries'—and industry's— pockets. Chemicals may make "rich" fathers as far as monetary wealth is concerned—they will certainly make impoverished sons.

Improve baseballs fields if you must, but keep aloof from mankind's most valuable resource—the soil.

DR. W. GRUSSENDORF
Agricultural Chemist
Altona (Man.), Canada

CW will still go along with the majority of reputable scientists who, for countless valid reasons, contend that nature can be improved upon.—ED.

We Said It Before

TO THE EDITOR: Your article, "Labor: Sellers' Market," in the January 5th issue . . . cited the fact that, "Little relief is in sight as regards engineers and chemists; the schools simply aren't turning enough out. The reason is simple: not enough young people."

While this may be a true statement, it is by no means the whole story. A contributing factor, and one far more important than the shortage of candidates, is the fact that the engineering profession is not sufficiently attractive economically. . . .

RAYMOND C. FULMER
Research Engineer
Stackpole Carbon Co.
St. Marys, Pa.

In a previous issue, Reader Fulmer, CW said (Nov. 24, p. 11):

"Private employers are reluctant and Government agencies are unable to pay—consistently, year after year—wages high enough to encourage a supply of technical manpower adequate for boom-period demands."—ED.

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: The Editor, Chemical Week, 330 W. 42nd St., New York 36, N. Y.

NEWSLETTER

Labor is fidgety this week. The Wage Stabilization Board's mills are grinding too slowly to suit the steelworkers, and 35,000 of them in Gary threaten to strike within a month if WSB doesn't act.

Aluminum workers, too, are getting restive. Kaiser Aluminum & Chemical Co. is faced with a CIO strike (11,000 men) February 1; Aluminum Co. of America is faced with a CIO strike (15,000 workers) February 1, and an AFL strike (9,500 employees) February 3.

The unions demand 18½¢ an hour plus other benefits from Alcoa; the company says the "package" would cost 50¢ an hour.

Highlighting the difficulty of labor negotiations is the disagreement over plain facts in the textile industry. The textile workers union (CIO) reported "spectacular gains" in all branches of the industry—fat profits and large salaries to management, but little for the worker.

But that's news to the companies, who experienced last year the worst slump (CW, Dec. 29, '51) since World War II.

An aluminum strike will make a bad situation far worse. NPA has already cut aluminum allocations for chemical, cosmetics and beverage closures from 65% to 53% of the quarterly base quota.

One ray of sunshine in the amendment: A packer may choose weight instead of numerical quantity of closures as the basis for his quota; thus he can stretch his aluminum to make more closures.

But not all the news this week is gloomy: Twenty-four makers of scientific apparatus reported without exception that 1951 was a record year—and that augurs well for research activity.

Order backlogs averaged three to four months at the start of the year. Most firms predicted slightly higher sales in 1952.

The Office of Alien Property has filed a registration statement with SEC as an initial step in selling Schering Corp. (CW, Dec. 29, '51).

Value of the property, however, is considerably less than it might have been: All Schering-held patents at time of seizure will be made publicly available for a $15 service fee; and all patents granted since will be offered at "reasonable royalties."

Gulf Oil Corp. will build a 300 tons-a-day sulfuric acid plant and a propylene-to-gasoline polymerization unit at Port Arthur, Texas. Leonard Construction is building the former, Bechtel Corp., the latter; both will be completed this year.

Canadian Resins & Chemicals Ltd., will complete early next year a $2½ million vinyl resins plant at Shawinigan Falls, Que. Major product: vinyl chloride dispersion resins.

Add another name to the list of firms designing and constructing chemical process plants: Kaiser Engineers. The firm is working on a diatomaceous earth production unit for Great Lakes Carbon Corp. and a new job is a 19,000 barrels-per-day cat cracker for Texas City Refining Co.

"Yankee traders" aren't confined to New England: Up in Canada, Consulting Engineer J. R. Donald has suggested to Alberta officials that the right to export natural gas to the U. S. be "swapped" for U. S. tariff concessions.

He contends that Alberta won't be able to build up its own chemical industry if exported gas is used to expand a tariff-protected U. S. industry. He cites restrictions on exports of wood pulp, which have created a Canadian industry exporting higher-value products.

The Northwestern states, he claims, are a lucrative potential market for Canadian chemicals—once import barriers are lowered.

Meanwhile, the Alberta government is considering six applications for export permits, is expected to reach a decision by spring.

A barrier of a different kind is keeping Tidewater Associated Oil Co.'s research and supervisory employees confined within the Bayonne (N. J.) refinery while 1,900 production workers are out on strike.

The researchers aren't researching, though; they're walking guard around tanks, cooking and washing dishes, and generally keeping the plant and its embattled inhabitants in good repair.

Reason for their week-long confinement: The company claims illegal picketing, says the pickets won't let back in anyone who leaves. But the plant requires maintenance, so the research men and supervisors volunteered to stay.

Monsanto Chemical is out after a cool $40 million in new capital. A stock offering of 400,000 new common stock shares will be made early next month through a group of underwriters headed by Smith, Barney & Co.

Proceeds will be determined by the price of Monsanto common right before the new offering; it's around 100 now. Present stockholders won't get a first crack at the new shares.

Another hint of future expansion comes from Fredericksburg, Va. Stauffer Chemical Co. has taken an option there on 450 acres.

What the plant will make or when it will be built are unanswered questions, but it will be one of eight Stauffer plans to build from coast to coast in a long-range expansion program.

More solidly pinned down are Mathieson Chemical's plans for its $2,150,000 hydrazine plant at Lake Charles, La., for which it has been granted a certificate of necessity. Construction is slated to start at once.

A new anti-arthritis compound related to cortisone is now in commercial production by Merck & Co. Availability is limited.

The new compound, hydrocortisone acetate, is no easy-to-make cortisone substitute. It is derived from the same materials and its synthesis requires even more steps; but it is more useful than cortisone in certain types of arthritis.

How big a chemical customer is the Army? The Chemical Corps told CW last week that since the Korean conflict started, about 5,000 tons of napalm and about 1,000 tons of various other chemicals have been shipped to the war area. The list of Korea-bound materials is almost as long as the whole roster of commercial chemicals.

. . . The Editors

chromates are working on the railroad

In the modern diesel locomotives as well as the sleek streamlined passenger trains, chromium chemicals play an important role.

Millions of pounds of chromates and bichromates will be used this year as corrosion inhibitors in diesel cooling systems. This protection is essential for continued operation of the railroads. In other parts of the locomotive, hard chromium plating increases the life of cylinder liners and bearing surfaces, thereby contributing to the greatly increased mileage which a diesel locomotive can operate without shop service.

Passenger equipment today makes frequent use of chromium plating for tarnish-free decoration and resistance to wear, while in air conditioning equipment chromates again are the most effective corrosion inhibitors.

In maintenance of the right of way, chromates are used for preserving wooden poles, cross arms, bridges, platforms and railings, furnishing protection against rot and termites, while providing a surface which is clean and may be painted. Freight cars also have a longer life due to the value of chromates as wood preservatives.

Still other applications, which are under study and test, indicate that the railroads, like many other important industries, are finding in chromium chemicals a new source of economies in operation and maintenance.

Write to our Research and Development Department for further information regarding chromium chemicals.

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•

Potassium Bichromate

•

Sodium Chromate

•

Chromic Acid

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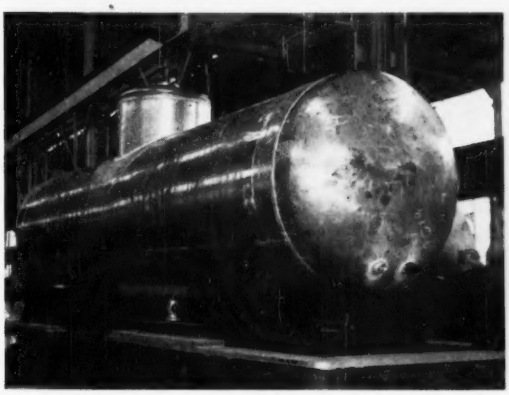


NO RELIEF IN SIGHT: Tank car builders far behind schedule, chemical makers beat bushes for transportation.

Tough to Beat the Tank Car Dearth

In a generally acute tank car shortage, chemical cars, that have to be specially built and which take more steel, are shorter still.

Steel—not capacity—is the bugaboo, as tank car producers are operating considerably below capacity.

There is little hope for relief until the middle of 1953, and even then it is doubtful.

The specter of curtailed production is looming on the horizon for many chemical companies as the tank car shortage grows worse with no relief in sight.

As yet the situation has not reached this parlous point, but if the industry continues to expand—as it gives every indication of doing—and tank car builders continue to operate at about three-quarters the output needed to meet demands for 1952, we could come to this sad pass.

Twin culprits, of course, are the sudden demands of the Korean crisis and defense preparations, and the lack of steel. Estimates indicate that present car capacity at the three building companies—General American Transportation Co., American Car and Foundry Co., and Union Tank Car Co.—is sufficient to meet the presently estimated demands for 1952, but only if they operate at capacity; and for that they need steel.

Pressure Cars: Biggest headache to chemical traffic managers are chlorine and LPG cars. These are special cars, must be built to order, cost more, take more steel, and at present are in great demand. Some companies have had to wait as long as 20 months after placing an order. In an environment of shortage, these special chemical cars are conspicuous for being even shorter.

One of the most pressing troubles brought on by lack of tank cars is the need for extra storage. With shipments taking longer, and with more being produced, many companies are finding it tough going to store their products. As a corollary to this, the shortage is further aggravated by the easy habit of using tank cars as storage tanks, causing the slow turnaround that is further hampering the shipper.

Moreover, a company puts in an order for enough cars to fill its needs; but by the time they are delivered new production has gone on stream and the new cars just about take care of that—leaving the original shortage either unchanged or a little worse.

Second Best: Caught in this pinch, most chemical companies are casting about for adequate tank car substitutes. Latest figures show an inclination to ship by water or tank truck, but as yet, except in certain commodities, the trend is not well defined.

While output of sulfuric acid, for example, is increasing, the percentage shipped by rail has decreased. Most of this is going to barges and tankers —relatively little to tank trucks.

Asphalt, on the other hand, is shifting to tank trucks. While production was up 60%, rail tonnage was down 49% in 1951, and most of this went to tank trucks.

Most chemical companies, indeed, are finding it necessary to shift much of their carrying to tank trucks, at least for short-haul operations. But they apparently don't like it.

The trouble with tank trucks seems to be their small size, and the difficulties of loading and unloading. Cost of loading and unloading, and of preparation for shipment, is often too expensive to make tank trucks usable except as an emergency measure for short hauls.

Another big factor working against the encroachment of tank trucks is that most plants have their loading systems set up for rail shipment; the difficulties of loading trucks are a burden.

Generally, companies are trying to use the tank trucks as much as possible, but for many chemicals tank

trucks cannot be used, and most traffic managers agree that there just isn't any practical substitute for a tank car.

Output Only Answer: The only answer, apparently, is more cars. As of Nov. 1, 1951 there were 9,182 cars on order. Of these 2,764 were LPG cars, 490 caustic cars, 608 chlorine cars, 84 anhydrous ammonia cars, 1,238 dual- and triple-purpose pressure cars, and 1,772 for miscellaneous chemical service.

At the rate of 850-950 cars a month—the present goal—these would be produced easily during 1952, and even some of the backlog taken up. But production does not appear to be anywhere near this level. On the basis of Nov. 1 figures, it appears that only two-thirds of the needed tank cars were produced in 1951. On top of this, production for the first and second quarter of 1952 will certainly be far below the 850-950 per month figure, more probably somewhere between 650 and 700. The picture is dark.

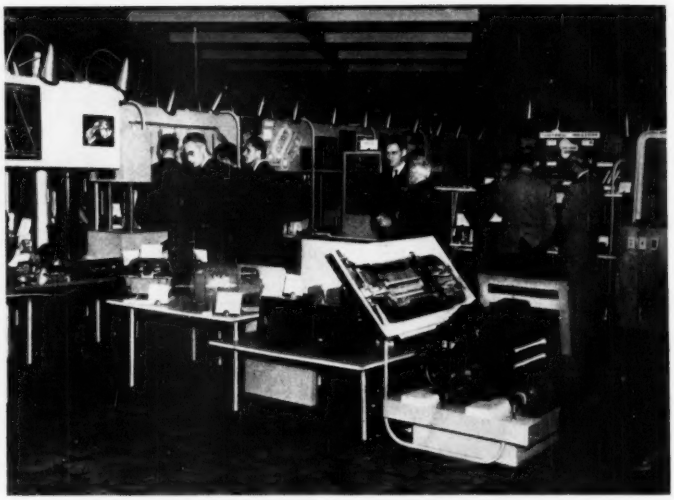
By 1953 it is estimated that we will need a total of 15,000 new cars. At present rates of production, it is difficult to see just where they will come from.

Working Improvements: Experts in the field point out that, while the basic trouble is lack of cars, users are not operating in the most efficient way.

One of the major criticisms: long turn-around time. Cars standing idle as storage tanks are a waste of material. The obvious solution is to increase storage capacity; but there again the rub is steel. Another suggested way of lessening turn-around time: work more shifts and weekends in loading and unloading.

Another potential improvement is the production of more dual- and triple-purpose cars. One of the most exasperating parts of the tank car picture is the seasonal nature of much shipping. By producing cars that can carry many products, the chance of their standing idle due to seasonal fluctuations is greatly lessened. Thus LPG cars, used mainly in the winter, can be adapted easily for anhydrous ammonia, which is shipped largely in the summer.

Dark Future: At present, production appears to be at least three months behind schedule; and it's doubtful that it can catch up. In fact, the lag is likely to increase. The only "out" is a possible failure of new facilities and expanded facilities to come into production as planned; but that's unlikely.



SILICONE EDUCATION: "Silicones must be seen to be believed."

Traveling Salesman

Dow Corning Corp. has come up with the latest thing in "traveling salesmen"—a whole exposition that moves from city to city "selling" the company's silicones to potential customers in industry, government and the military. Last week it was in New York; next week it will be in Boston.

Working demonstrations are combined with hundreds of exhibits of industrial and military applications in what the company claims is the first comprehensive exposition of silicone uses.

Originally designed to illustrate the advantages of silicones to top government and military personnel in Washington, the exposition was so well received there that company officials decided immediately to send it on a tour of the major industrial centers of the country. So far company officials have no reason to regret their decision; the exposition is going over much better than they had even anticipated, with better attendance, and more positive reactions than expected.

Educational Job: The show is mainly the baby of W. R. Collings, vice president and general manager of the company. As he explains it, selling any new or different product or material is primarily an educational job. Prospective customers must be shown what the product can do, and, particularly, how the product fits into the customers' own set-up.

In the case of silicones the problem is compounded by the number of products involved—Dow Corning was producing only five different silicone products in 1944, but today it makes over a hundred—and the variety and unusual nature of the properties involved. The answer was the creation of as complete an exposition as possible that could be moved from place to place and set up in a convenient location, preferably a hotel.

Iron Hot: Since properties peculiar to silicones are essential to many defense projects, and in anticipation of the large expansion in productive capacity already planned for 1953, the company felt that now was the time to strike.

While the exhibit is intended to acquaint industry men with what silicones have done, more important in Collings' view is its potential stimulation to invention, which will bring new uses and new applications. In short, the exposition is planned to up sales as much as possible, in as many ways as possible.

Heat Stability Plus: Visitors to the exhibit see, among other demonstrations, how Silastic (Dow Corning's silicone rubber) remains soft and flexible at temperatures far above and below the limits of organic rubbers; the electrical properties of silicone insulation; and the water repellency of silicone-treated fabrics.

Attendance at the exposition is by invitation only. Invitations are generally sent to customers and prospects in each city visited, including top management, research men, engineers, technical societies, rubber groups, deans and department heads of engineering schools. So far the show has been to Washington, Cleveland, De-

troit, Philadelphia and New York. After Boston, it is going on to Pittsburgh, Dayton, Chicago, Los Angeles, Wichita, Fort Worth, Houston, and a return engagement at Washington.

In all these cities Dow Corning officials think they will find new customers, stimulate new thinking which will be translated into more sales. Indeed they are all smiles over the early results of the exposition's safari, and that means results already.

Union Loses

The International Chemical Workers Union (AFL) has lost a fight with the National Labor Relations Board and the U.S. Phosphoric Products Division, Tennessee Corp., over the company's firing of a supervisory employee.

In NLRB's interpretation, under the Taft-Hartley Law a supervisor may be fired for union activities, but not for refusing to engage in an unfair labor practice. When the company fired a labor foreman, the Chemical Workers charged that he had been fired for refusing to engage in an unfair labor practice; viz., he had been asked to stop helping the Chemical Workers and work instead for an independent employees' association, or company union.

In ruling against the union, the trial examiner held that, while the NLRB interpretation was correct, there was no evidence of an unfair labor practice being forced on the foreman, and he had been fired simply for helping the union organize the plant.

More Containers Now

Latest figures of the National Production Authority's Containers and Packaging Division show a brighter outlook for the first half of 1952 in the packaging situation. Exception: containers made of, or using, aluminium or copper.

The improved conditions, according to NPA's Division, are based on three major developments: (1) Growth of an adequate supply of substitute or alternate containers; (2) leveling-off of demand after the scare buying that occurred prior to the third quarter of 1951 in anticipation of coming shortages in packages and containers; (3) expanded output of some of the basic container materials.

Generally the supply is more nearly in balance with demand now than at any time since June 1950. While there may be some short-term spot shortages, the over-all picture at present indicates that there will be enough substitute packaging available to meet most demands.

Eased and Adequate: The supply of fibre drums, cans and tubes appears adequate, with a slight increase in drum production resulting from increased demand as some consumers switched from steel drums. Demand for fibre tubes and cans eased recently, and production dropped somewhat. But metal for caps and tops still means a bottleneck in the flow of these containers.

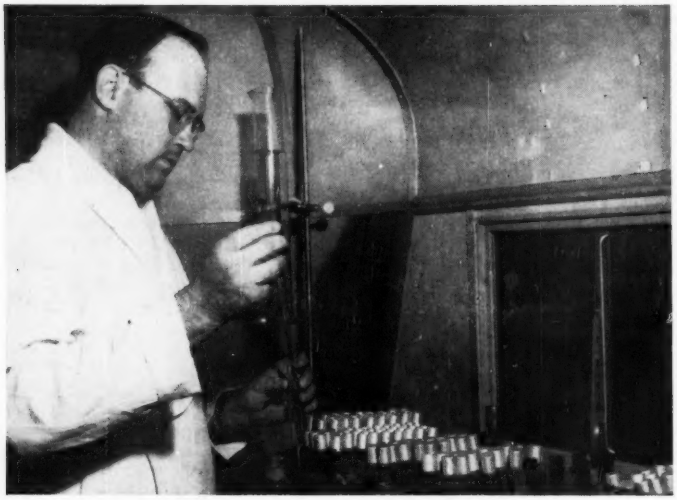
Production of paper shipping sacks and bags has caught up with demand, and textile bags appear to be in excess as the downward trend in their prices, which began early in 1951, continued through the third quarter. While the over-all glass situation is reported as "good," selenium and fluorspar are short. For collapsible tubes, NPA states that supply was sufficient for needs in the third quarter of 1951, and generally production appears to be down.

Still Tight: While shipments of metal cans in the third quarter of 1951 were up almost 40% over the second quarter, demand was heavy and the supply is still likely to be tight in early 1952. Nevertheless shipments of tin, black and terneplate are improved and a buildup in manufacturer's inventories has resulted.

Other "tight" areas appear to be in steel drums, plastic films (particularly cellophane, which is still being allocated by makers), and general closures, where aluminum has been a problem. The supply of polyethylene has improved but is still tight.

Current List of DPA-Certified Chemical Facilities

COMPANY	LOCATION OF FACILITY	PRODUCT	AMOUNT ELIGIBLE	PERCENT
Norton Co.	Worcester, Mass	Silicon carbide grain	$ 653,895	65
Minnesota Mining & Mfg. Co.	St. Paul, Minn.	Abrasive products	6,367,850	65
Union Carbide & Carbon Corp. (Transport Service)	Home office, N.Y.	Oxygen and nitrogen	6,637,400	60
			2,194,500	45
Heyden Chemical Corp.	Fords, N.J.	Formaldehyde	280,000	50
M. W. Kellogg Co.	Jersey City, N.J.	Thermoplastic material	131,452	60
Food Machinery and Chemical Corp.	New York, N.Y.	Soda ash	13,737,450	30
Hofman Laboratories, Inc.	Newark, N.J.	Liquefied hydrogen	26,967	45
Union Carbide & Carbon Corp.	Niagara Falls, N.Y.	Tungsten metal powder	529,500	60
Pennsylvania Salt Mfg. Co.	Natrona, Pa.	Manufacture of kryolith	158,570	70
E. I. DuPont de Nemours & Co.	Parkersburg, W. Va.	Fluoroethylene	503,900	60
			10,560	45
Southern Oxygen Co., Inc.	Greensboro, N.C.	Oxygen	31,100	60
The Davison Chemical Corp.	Baltimore, Md.	Petroleum catalyst	210,494	75
Southern Oxygen Co., Inc.	Bladensburg, Md.	Oxygen and hydrogen	618,900	45
			137,439	60
Aluminum Co. of America	Alcoa, Tenn.	Cryolite	203,600	70
Southern Oxygen Co., Inc.	Kingsport, Tenn.	Oxygen and hydrogen	71,600	45
			29,100	60
Aluminum Ore Co.	Mobile, Ala.	Alumina	222,878	70
Sterling Drug, Inc.	Cincinnati, Ohio	Anti-malarial drug components	104,247	60
The Dow Chemical Co.	Midland, Mich.	Aniline	135,000	60
The Pure Oil Co.	Toledo, Ohio	Sulfuric acid	32,000	40
			2,478,000	90
Koppers Co., Inc.	Chicago, Ill.	Naphthalene	196,000	60
Allied Chemical & Dye Corp.	Chicago, Ill.	Coal tar chemicals	10,650,000	60
The Edwal Laboratories, Inc.	Ringwood, Ill.	Ammonium thiosulphate	10,356	65
Esso Standard Oil Co.	Baton Rouge, La.	Iso-octyl and tridecyl alcohol	2,760,000	70
			240,000	50
Humble Oil & Refining Co.	Baytown, Tex.	Butylenes	59,755	65
			25,436	50
Reynolds Metals Co.	Corpus Christi, Tex.	Aluminum	42,319,000	85
Reynolds Metals Co.	State of Arkansas	Aluminum	33,492,000	85
Gulf Oil Corp.	Crane County, Tex.	Sulfur	200,000	70
Shell Chemical Corp.	Houston, Tex.	Synthetic glycerine	1,173,600	75
			188,000	45
			152,900	15
Humble Oil & Refining Co.	Baytown, Tex.	Sulfuric acid	588,000	70
Reynolds Metals Co.	Corpus Christi, Tex.	Aluminum pig	3,250,000	85
Reynolds Metals Co.	Saline County, Ark.	Alumina	1,831,300	80
Consolidated Chemical Industries, Inc.	Baton Rouge, La.	Sulfuric acid	3,000,000	70
American Smelting and Refining Co.	Denver, Col.	Cadmium	73,475	25
The Standard Slag Co.	Gabbs, Nev.	Refractory magnesite	451,305	50
Anaconda Copper Mining Co.	Alpine County, Calif.	Sulfuric acid	1,550,000	70
Western Oxygen, Inc.	Seattle, Wash.	Oxygen gas	10,348	45
			41,792	60
Aluminum Ore Co. (East St. Louis Works)	East St. Louis, Ill.	Alumina	523,480	70



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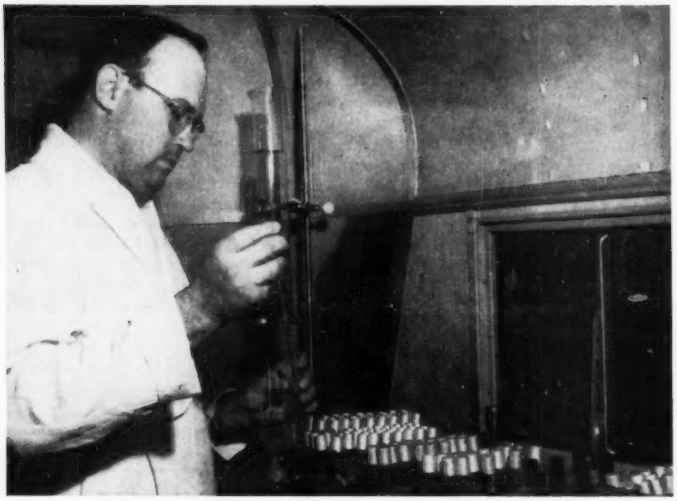

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CONTINUED

Pyrenone Insecticides

production of the Pyrenone-treated herds returned to normal. That of the other 13 herds continued to decrease throughout the horsefly season.

Data included in the report show that during July, the 13 herds which were not treated with Pyrenone showed an average of 8.50 tabanids per animal while the 12 sprayed herds averaged only 0.38 tabanids per animal. By August, when the infestation period had nearly passed, the untreated herds began to increase their butterfat production, but it was still more than 20 per cent below what it had been in the spring. Meanwhile, the 12 herds treated with Pyrenone were able to maintain normal production.

*Reg. U.S. Pat. Off.

New Chemical Weed Killer Erases All Plant Growth, Is Harmless to Animals

A non-selective chemical weed killer, said to "erase" dense growths of mixed grasses and broad-leaf weeds and to leave only an expanse of bare soil in its wake, has been developed. Designated chemically as 3-(p-chlorophenyl)-1,1-dimethylurea, the product is expected to find commercial uses in preventing growth of grass and weeds around manufacturing plant sites, railroad roadbeds, storage tanks, and other locations where such growth creates fire hazards and other undesirable conditions. The manufacturer states that the chemical is not flammable or corrosive, that it is relatively nonvolatile, and that it can be applied as a spray when dispersed in water. Laboratory tests are said to have shown that it is safe so far as toxic effects on warm-blooded animals are concerned. The new weed killer is reported to give excellent control of perennial weeds such as Bermuda grass, quack grass, Johnson grass, and bindweed, as well as practically all annual weeds. Tests are in progress to determine the duration of soil sterility produced by the chemical in various types of soils.

Polytetrafluoroethylene Fabricated by Extrusion Of Lubricant Mixture

Fabrication of polytetrafluoroethylene by extrusion, long a difficult problem, is reported solved by a new technique which involves mixing the coagulated polymer with certain lubricants and extruding the mixture below the resin's fusion temperature. Aliphatic, aromatic, or oxygenated hydrocarbons are said to be suitable lubricants, and optimum lubricant concentration has been found to be 18 to 20 per cent. Lubricant and resin may be combined during the resin coagulation process, by spraying the lubricant onto the dried powder, or by slurrying the two in a large volume of organic liquid. Following extrusion, the lubricant is removed either by extraction in a solvent bath or by volatilization in a heated chamber. Fusion of the extruded product at about 327°C. completes the process. Super-thin tape reportedly can be fabricated by using this method followed by quenching the plastic in cold water and cold-drawing it.

Convert Atomic Energy Directly to Electricity With New 'Battery'

Development of an "atomic battery" for direct conversion of radioactive energy into electrical energy was announced recently. The battery is described as a specially constructed cell having electrodes of two dissimilar materials surrounded by a gas. Exposure to radioactivity ionizes the gas, and current is generated as positive ions, formed in the gas, are attracted to one electrode, and electrons to the other. Only a small amount of current can be produced by the cell. Enough to light a 100-watt light bulb, for example, would require a battery of this type one cubic yard in size. The first industrial application will be in a line of instruments designed for precise measurement of gamma activity. The new atomic cell is said to be particularly useful in this way because it eliminates the need for additional power supply to the instrument.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Research reports and data can be filed with tremendous savings in space as a result of a method which reproduces 60 pages of material on a 3 x 5 inch card. A small portable device magnifies each page to original size for reading, it is said. **(No. 759)**

Quick, accurate viscosity checks can be made on the job in paint, varnish, and lacquer manufacture with a new viscosimeter, claimed to be inexpensive and easy to use. **(No. 760)**

A new polyglycol is claimed by the manufacturer to be useful in hydraulic brake fluids, as an intermediate for surface active agents, and as a solvent and carrier. **(No. 761)**

A new metal primer for use with active-solvent protective coatings and conventional paints is described as a heavy-bodied, oil-modified synthetic resin vehicle which carries a high percentage of inhibitive pigments. **(No. 762)**

For patching holes or tears in vinylite film articles such as shower curtains, cushions, inflatable toys, etc., repair kits are available containing strips of colored plastic and a specially-compounded adhesive. **(No. 763)**

Safer, easier removal of acids from carboys is said to be possible with the help of new polyethylene pumping and pouring equipment recently placed on the market. **(No. 764)**

A new stabilized chlorinated rubber for use in industrial maintenance paints is expected to give manufacturers marked improvement in heat and light stability, better weathering, and reduction in under-film rusting. **(No. 765)**

Diamino diphenyl sulfone is now available for use as a base for ion-exchange resins and as an intermediate in organic and dyestuff synthesis, according to a recent report. **(No. 766)**

A new waterless hand cleaner is reported to easily and completely remove paint, ink, grime, grease, and chemicals without the use of water, and without drying the skin. **(No. 767)**

Speedier cure times for molded plastic parts and simplified molding of intricate shapes are said to be obtained with a new phenolic compound which can be pre-heated to higher temperatures than conventional compounds. **(No. 768)**

the Bay Chemical Co., a division of Morton Salt Co. Engineering and construction are being handled by Rust Engineering Co. and Rust Process Design Co.

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Potash: Work on Duval Sulfur and Potash Co.'s New Mexico potash plant is proceeding on schedule. Individual units and pieces of equipment are now being tried out, and full operation is expected about March 1. The plant will be able to process 2,000 tons of ore per day.

COMPANIES . . .

Parke, Davis: The pharmaceutical house has optioned a 548-acre site near Cowan, Tenn., and is testing nearby water supplies.

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United Feldspar: A $500,000 loss was reported when the company's 30-year-old Minpro, N.C., plant burned. A sprinkler system on the property failed to extinguish the blaze because its 100,000-gallon water supply was inadequate, an official said.

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Ashland Oil & Refining: The company has purchased 90 acres of land in Baton Rouge. The property is located on the west bank of the Mississippi near Port Allen.

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Southern Oxygen: A $1.4 million issue of 6% convertible debentures was floated in New York last week.

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M. H. Baker Co.: This new Minneapolis company was formed early this month as an Upper Midwest sales agent for resins, essential oils and chemical specialties.

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U.S. Rubber: The company's board of directors has approved a stock-splitting plan whereby present holders of $10 par shares will end up with three shares of $5 par value stock.

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Falls Industries: This Solon, Ohio, manufacturer of graphite equipment has received a $75,000 loan from the Reconstruction Finance Corp., classified as a disaster loan. The money is to be used for equipment and working capital.

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Alcoa: A registration statement has been filed with the SEC covering a proposed issue of $125 million in sinking fund debentures, to be issued late in January. In addition, the company is completing arrangements for private loans of $100 million.

The money will go toward financing company expansion. New units to be completed by spring, 1953, will increase Alcoa's capacity by 55%, or a rise of 410 million pounds per year.

FOREIGN . . . . .

Sulfuric Acid: The East German plant of Chemiewerk Oranienburg is now producing sulfuric acid from magnesium sulfate. Technical magnesia said to be superior to that obtained from imported magnesite is a by-product.

The process was developed at the government-owned ALCID plant at Radebeul, and is of great practical importance to Germany's East Zone since it utilizes the large amounts of magnesium sulfate resulting from East German potash production.

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Australia: Distillers Co., Ltd., of Britain, and Colonial Sugar Refining Co., Ltd., of Australia will amalgamate their Australian chemical interests through the medium of the $15 million CSR Chemical Pty., Ltd., a large scale manufacturer of cellulose acetate, plastic molding powder, ascorbic acid, sorbitol, and mannitol. Under its new management CSR Chemicals will soon produce acetic anhydride, aspirin, and a broad range of other pharmaceutical and industrial chemicals.

•

Hail Control: Hail-battered South African farmers are converting crop-destroying hail storms into relatively harmless rain by hurling cloud-seeding chemicals at oncoming storm-clouds via rockets. Here's how they work it: Farmers are alerted at the approach of threatening clouds, launching sites are manned, and the rockets ignited at given intervals. Results obtained have been so excellent that launching platforms and rockets will soon be standard equipment on South African farms.

•

Deodorant: A new antimycotic deodorant—FS64—is now being marketed in Germany by Therpak-Chemie Hartke & Co. (Hamburg). The substance is said to be effective in toilet creams and toothpastes, and when used in antiseptic soaps, is claimed to combat both Gram-positive and Gram-negative bacteria.

Addition of 3% FS 64 to antiseptic soaps is said to be sufficient to combat for a considerable time such strong odors as onion, petroleum, fish, and perspiration. The new deodorant neither develops its own odor when added to other preparations, nor does it impair color or shelf life.

KEY CHANGES . .

Byron T. Shaw: To administrator, Research Administration, Dept. of Agriculture.

Randolph T. Major: To chairman, Committee on Chemical Warfare, Research and Development Board. He is vice president and scientific director, Merck & Co.

Edwin J. Boehm: To vice president, Prior Chemical Corp.

Clyde T. Marshall: From vice president and marketing manager, Monowatt, Inc., to general manager, agricultural chemicals division, Commercial Solvents Corp.

Marshall M. Smith: To managing director, Paris office, Emhart Mfg. Co.

Murray Stempel: To executive vice president, Paisley Products, Inc.

W. G. Lloyd: To general manager, Bombay branch, Parke, Davis & Co.

Thomas C. Anderson: From general superintendent, to director, production and engineering, Parke, Davis & Co.

Earl W. Walke: From director, personnel relations, to director, U.S. and Canadian production (except Bay Division at Bridgeport), Parke, Davis & Co.

H. M. Sossman: From general sales manager to vice president in charge, commercial development, Quaker Rubber Corp.

Earnest M. Loveland: To vice president in charge of production, Seaplant Chemical Corp.

Joseph Schultz: From general manager to president and treasurer, Lady Esther, Ltd.

B. T. Rocca, Jr.: To executive vice president, Pacific Vegetable Oil Co.

Fred R. Conklin: To works manager, Tennessee Eastman Co.

Andrew R. Olson: To vice president and general manager, Suburban Propane Gas Corp.

Alexander Calder, Jr.: To executive vice president and general manager, Union Bag & Paper Corp.

DIED . . . . . .

Raymond C. Gaugler: President, American Cyanamid Co., since January, 1951 and director of company since 1929, January 11, in New Rochelle Hospital of a cerebral hemorrhage. He was 59.

Get this Straight!

Powell has always kept pace with every development in the Chemicals and Process Industries. As new demands arise, Powell Engineers will design valves to satisfy them.

Shown here are a few of the many Powell Valves made in the widest selection of corrosion-resisting materials ever offered to these industries.

The Wm. Powell Co.
Cincinnati 22, Ohio

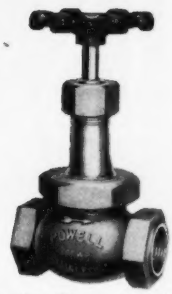


Fig. 1861—200-pound Stainless Steel Globe Valve with screwed ends, union bonnet, inside screw stem and plug type disc. Available in a variety of other corrosion-resisting metals and alloys.

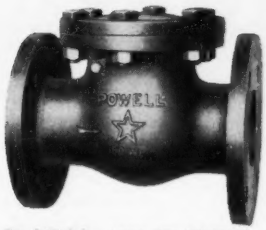


Fig. 2433 S.S.—Large size 150-pound Stainless Steel Swing Check Valve with flanged ends. All dimensions conform to latest standards. Available in other corrosion-resisting metals and alloys, with body-cap bolts and nuts in Stainless Steel. Also with screwed ends.

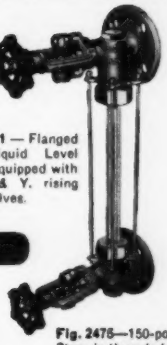


Fig. 1891 — Flanged End Liquid Level Gauge equipped with O. S. & Y. rising stem valves.

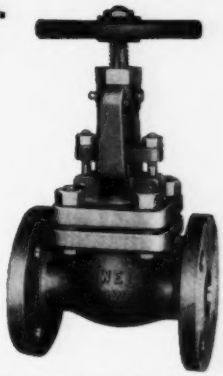


Fig. 2475—150-pound, flanged end, O. S. & Y. Globe Valve. Stem is threaded and guided through a bushing screwed into upper yoke. Seat and plug type disc can be easily reground if necessary. Conforms to all latest standards. Available in a large selection of corrosion-resisting metals and alloys with bolts and nuts in stainless steel. Also with screwed ends.

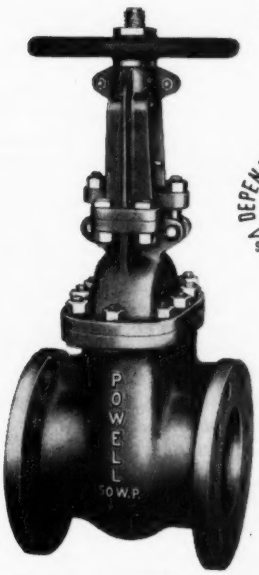
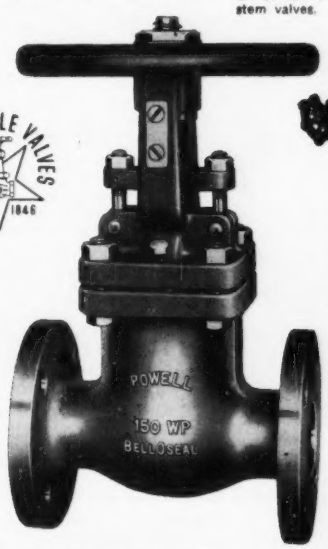


Fig. 2453 S. G.—Large 150-pound O. S. & Y. Stainless Steel Gate Valve with precision-fitted, accurately guided solid wedge. Can also be furnished with split wedge. Made in sizes 5" to 30", incl., with separable yoke arms. This valve conforms to all the latest standards. Available in a wide selection of other corrosion-resisting metals and alloys.

DEPENDABLE VALVES SINCE 1846



Bell-O-Seal Globe Valve. Designed to handle hazardous fluids; for high vacuum service; or for use where a packless valve is needed. Available in Globe, Angle and "Y" patterns, with screwed, flanged or welding ends. Made in a wide variety of corrosion-resisting metals and alloys, in sizes from ¼" to 12", inclusive.

POWELL VALVES for CORROSION-RESISTANCE are available in the following metals and alloys

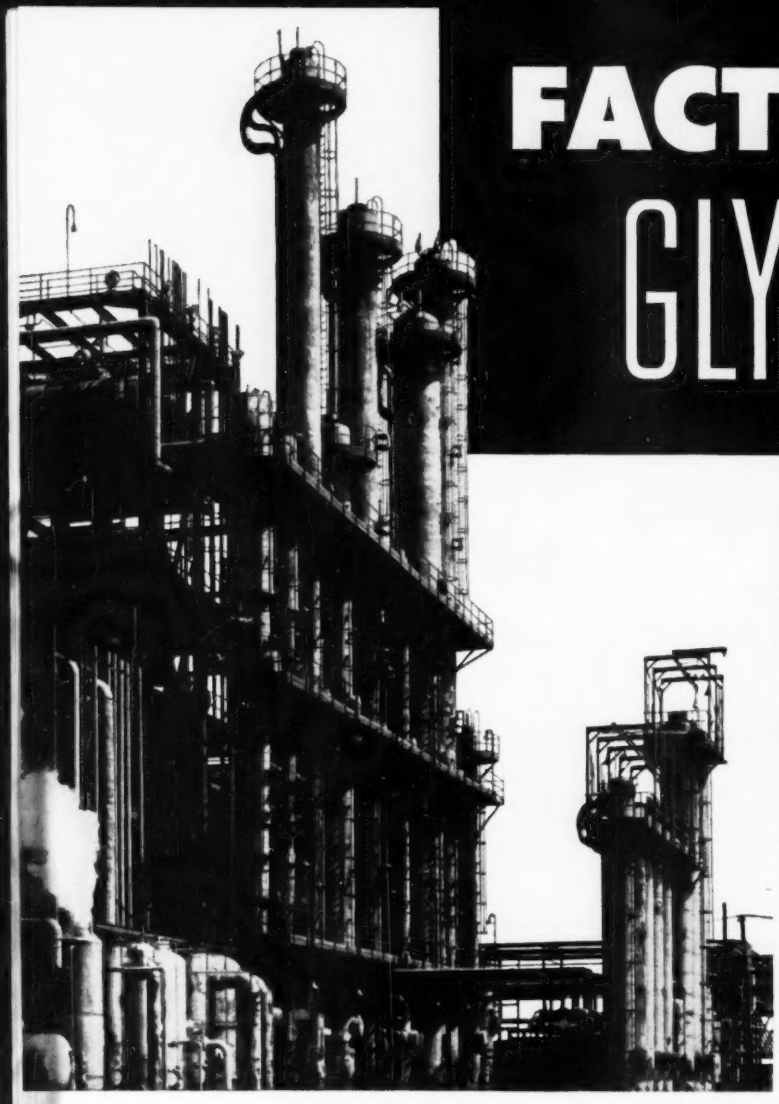
Stainless Alloys	Nickel and Nickel Alloys	Bronzes—Acid, Aluminum, Silicon
18-8S	Nickel	Everdur
18-8S Mo.	Monel Metal*	Herculoy
18-8S Cb.	Inconel*	Ampco
Misco "C"	Hastelloy Alloys†	Ampcoloy
Durimet 20	(A, B, C and D)	76
11.5-13.5% Cr. Iron	Illium	90-10
18% Cr. Iron	D-10	88-10-2
28% Cr. Iron		
25% Cr. 12% Ni.		
Alloy Steels	**Cast Irons**	**Aluminum**
Carbon Steel	Cast Iron	Alcoa No. 43
4-6% Cr. .5% Mo.	3% Nickel Iron	Alcoa No. B-214
3.5% Nickel Steel	Ni-resist*	Alcoa No. 61 S-T
6-8% Cr. .5-.75% Mo.	**Hard Lead**	**Molybdenum**
8-10% Cr. 1.1-1.5% Mo.		**Silver**

*Registered trade-names of the International Nickel Co., Inc.

†A registered trade-name of the Haynes-Stellite Co.

POWELL VALVES

In Bronze, Iron, Steel and Corrosion-Resisting Metals and Alloys.



FACTS about the GLYCOLS

In times of shortages, steady profitable production is frequently endangered by the inability to get the proper raw materials. However, complete information about the various applications of chemical raw materials may help you use the materials currently in short supply in the most profitable manner. Despite today's shortages, Dow is also interested in helping you conduct experimental work with the glycols. Further research today may suggest new uses for the glycols, new ways in which they can serve you in future markets. For more information and technical assistance, write Dow using the coupon below.

The chemistry of the Glycols centers around the two hydroxyl groups which characterize them as glycols. They are intermediate in their properties between the alcohols with their single hydroxyl group and glycerine with its three hydroxyl groups. Like glycerine, the glycols are normally quite stable in air. At high temperatures, they tend to oxidize in air, giving rise to a wide variety of oxidation products such as aldehydes and acids. This oxidation can be reduced by the use of inhibitors so that the glycols can be used as heat transfer media.

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

Properties and Specifications of the Glycols

	Chemical Formula	Molecular Weight	Specific Gravity 25/25°C.	Freezing Point °F.	Boiling Point °F.	Flash Point °F.	Fire Point °F.
Ethylene Glycol.....	$HOCH_2CH_2OH$	62	1.112	7	390	241	257
Diethylene Glycol.....	$HOCH_2CH_2OCH_2CH_2OH$	106	1.116	15	475	275	293
Triethylene Glycol.....	$HOCH_2CH_2OCH_2CH_2OCH_2CH_2OH$	150	1.122	21	545	309	345
Propylene Glycol, Industrial.	$CH_3CHOHCH_2OH$	76	1.036	(−80)*	369	210	216
Dipropylene Glycol.....	$HOC_3H_6OC_3H_6OH$	134	1.025	(−54)*	446	244	253

SPECIFICATIONS

*Pour Point

	Specific Gravity @25/25°C.	Boiling Range 760 mm. Hg 5 to 95%	Acidity, Max. (As Acetic Acid)	Water Max.	Color Apha Max.
Ethylene Glycol.....	1.112-1.115	194-200°C.	0.01%	0.5%	15
Diethylene Glycol.....	1.115-1.118	240-250°C.	0.01%	0.2%	—
Triethylene Glycol.....	1.121-1.125	275-295°C.	0.01%	0.1%	60
Propylene Glycol, Industrial.	1.035-1.037	185-190°C.	0.005%	0.5%	10
Dipropylene Glycol.....	1.018-1.028	220-240°C.	0.01%	0.1%	20

This is ONE of a series of Dow advertisements you may wish to keep on file for reference and information. Write Dow for reprints.

SOLVENTS:

Glycols can be used to excellent advantage with materials which must be formulated with water, but which are not soluble in water. In this manner, Glycols can be used in cutting oils (soluble oils), textile lubricants, dry cleaning soaps, and industrial hand soaps to name a few applications. Glycols are used in the preparation of hydraulic fluids because of their solution compatibility, and in steam-set printing ink where the resins are dissolved in Glycols and precipitated by water or steam to set the ink.

Besides acting as solvents, Glycols offer stability and practicality because of their low volatility, high flash point, and favorable viscosity characteristics. For a better solvent, investigate the future role that Glycols can play in your production.

ANTIFREEZE AGENTS:

The Glycols are most well-known for their use in permanent-type automotive antifreeze, and they also give dependable protection to water-containing materials subject to low temperatures. Some common industrial examples are: water-base paints, cooling sprays, water-base hydraulic fluids, glass cleaners, de-icing compounds, cleaning compounds, sprinkling systems, radiant heating systems, and aircraft water supplies.

One of the family, Ethylene Glycol, is reacted with Nitric Acid to produce a lower freezing dynamite. Glycols can replace salt in cooling brines where they decrease the corrosion factor. Glycols added to gas well effluent prevent the water present from freezing on cooling when removing casing head gasoline.

HUMECTANTS:

Is the "drying out" of your product cutting into profits? If so, consider the future job that Glycols can do for you. The ability of the Glycols to absorb moisture out of the air can be put to profitable use to secure: longer freshness for cigarette tobacco, baked goods and food; softening agents for paper; dehumidifiers for air and other gases; protection against the drying out of print pastes in textile processes. Glycols can also be added to sizes to prevent flaking. Be sure to start your experimental work with Glycols today if your materials are liable to excessive drying out.

PLASTICIZERS:

For materials too brittle, Glycols are very effective as plasticizers. For example, by plasticizing the binder, Glycols add pliability and softness to composition cork sheets. They can be reacted with polybasic acids to give alkyd resins which are softer than corresponding ones made from glycerine. Other products which have been softened are moistureproof cellophane film, glues, some fibers and papers.

OTHER USES:

There are many examples of the versatility of the Glycols. Ethylene Glycol, for instance, in conjunction with Boric Acid and Ammonia is widely used in the manufacture of radio, radar, and television condensers: it is also used as a mold release fluid for asphalt grave vaults. Propylene and Triethylene Glycol, in vapor form, have been used in the control of air-borne bacteria. And, in some cases, the Glycols can be used as lubricants. Be prepared for future markets . . . start your experimental work with Glycols.

If you have a Glycols problem

WRITE DOW FOR INFORMATION AND TECHNICAL ASSISTANCE.

The Dow Chemical Company, Dept. OC-11A
Midland, Michigan

☐ **Please send me additional literature about the glycols.**
☐ **Please send _____ reprints of this advertisement.**

Name _____ Title _____

Company _____

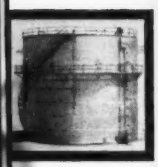
Address _____

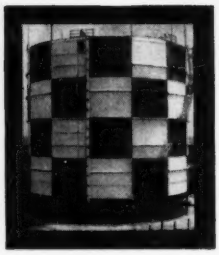
City _____ State _____

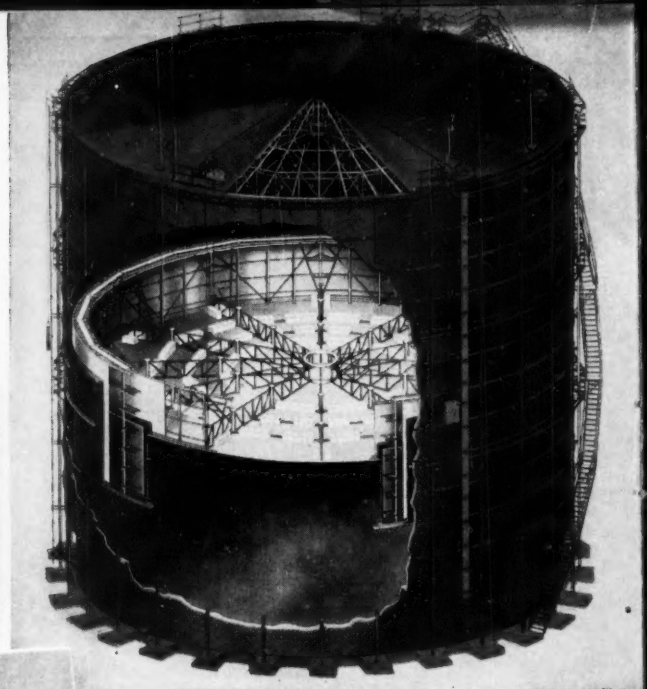
DOW

CHEMICALS

INDISPENSABLE TO INDUSTRY AND AGRICULTURE







safe, simple, 50 built *in three years*

See American Gas Association Builder's Committee Report (May, 1951)

As gasholders go, the Wiggins has a remarkably simple design. It has none of the complicated mechanisms of old-type gasholders. No materials that can be harmed by weather. Wiggins is the ONLY gasholder that uses no water, no tar, no grease. Wiggins assures no weather worries, no operating costs, no maintenance problems. It's the only gasholder with an absolutely dry, frictionless seal.

Designed by the famous conservation authority, John Wiggins. Built and erected by General American.

The frictionless piston rises and falls with changes in the gas volume. The gas tightness and impermeability of the Wiggins dry seal has been proved in actual operation.

Can be built to any capacity. Old gasholders can be converted and capacity increased as much as 50%.

for industrial and chemical process gases

TRADE MARK

GENERAL AMERICAN
TRANSPORTATION CORPORATION
135 South LaSalle Street, Chicago 90, Illinois

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Chemicals for Fungus Control

Military preparations are boosting the demand for chemicals to fungus-proof leather, rope, clothing, canvass, electronic instruments, telescopes, other equipment.

But industrial fungicides are no mere war babies. They find large markets in the textile, food, coatings, cosmetic, lumber, paper and leather industries.

Among chemicals developed to meet this growing demand, these classes are most important: metallics, phenolics, and organic derivatives of nitrogen and sulfur.

S. S. Block

With the first rumblings of war in Korea, sales of industrial fungicides began to soar. Warehouses were being filled with thousands upon thousands of shoes treated to stop mildew; miles upon miles of tent cloth were run through preservative baths to prevent rotting; manufacturers of electronic equipment were carefully dosing their coating lacquers to stop mold growth and moisture leakage.

Caught short in the Second World War, when rotted tow ropes, faulty radio insulation, and fungus-etched telescopes meant lost lives, the Armed Services were taking no chances this time. Government specifications called for fungus-proofing rain coating, barrage balloons, canvas leggings, cargo nets, duffle bags, rifle covers, life preservers and hundreds of other items.

No match yet for its agricultural counterpart, the ten-year-old industrial fungicides industry nevertheless provides bread and butter for many chemical manufacturers.

Use of industrial fungicides is by no means limited to the Military even though it has been the largest single buyer. Paint producers have discovered that what they once thought was dirt on painted houses is really mildew, are doctoring their paints with fungicides and marketing them as "mildew resistant." Food and cosmetic manufacturers have recognized appropriate chemical preservatives as necessities in marketing products with satisfactory keeping qualities. Even the housewife, (not to be taken lightly when figuring chemical markets) is beginning to place the bottle of mildew preventative on the shelf next to the insecticide and furniture polish.

Thrive on Water: Fungi exist almost everywhere and can consume almost anything organic provided, of course, that the conditions are right. The most common controlling factor in mold growth is moisture. Mold damage is more prevalent in areas of heavy rainfall and high humidity, but even in desert regions, mold growth may occur when sudden changes in temperature bring about condensation of moisture from the air. Molds thrive in warm climates but will grow, though less rapidly, in refrigerators and cold storage rooms. One example in point: Government equipment for shipment to Alaskan bases is being preserved from fungus deterioration.

AUTHOR BLOCK, an associate professor at the College of Engineering, University of Florida, Gainesville, as an expert on fungicides, is well qualified to appraise the field.

Mold, mildew, rot, and decay are terms that refer to fungi or to the type of damage they do. Mildew generally refers to surface mold growth and the damage resulting from it is not deep-seated. Where rot and decay fungi are active, they may bring about complete deterioration.

Fungi are stemless plants which lack chlorophyll and cannot synthesize their food from carbon dioxide and water like other plants. They consume organic nutrients and, in this way, help to rid the earth of debris such as dead leaves and trees. Unfortunately the fungi do not detect the difference between a dead pine tree in the forest and a pine board in the lumberyard. This lack of selectivity by fungi costs man billions of dollars every year in industrial products and crops damaged and destroyed. But chemicals have been found very practical in bringing about such selectivity.

Fungus Killers: Chemicals that are potent deterrents of mold growth are called fungicides. Even though many so-called fungicides really just inhibit molds rather than kill them, the practical result is the same. The mechanisms by which fungicides poison fungi are only beginning to be understood; however, the technology on the use of fungicides is much more advanced.

While many compounds are effective fungicides, the end-use specifies the individual selection. For rot-proofing tents and awnings, the materials should be resistant to rain and sunlight. With articles of personal use, the properties of color, odor, and toxicity are of chief significance.

Most of the industrial fungicides fall into the following classes: metallics, phenolics, and organic derivatives of nitrogen and sulfur. Of the metals used as fungicides, copper is by far the most important. Copper is outstanding in its toxicity to wood- and cotton-rotting fungi and, in certain compounds, plays an important role in helping to control surface-growing molds. Copper, at the concentration used, is not expensive and is relatively harmless to humans.

COPPER NAPHTHENATE

Wheelhorse of industrial fungicides is copper naphthenate, a bluish-green waxy solid having the distinctive naphthenic acid odor. It is soluble in such cheap solvents as mineral spirits,

kerosene, waste crankcase oil and creosote. Known and used in Europe for forty years, it was not until World War II that copper naphthenate came into its own. In 1950, the last year for which statistics are available, 3,740,000 pounds of this material were produced.

Copper naphthenate has been shown by extensive laboratory testing and actual service trials to be superior in rot-proofing to the oleate, stearate, resinate, and tallate soaps of copper. It is quite resistant to leaching and does not require—as do certain otherwise excellent fungicides—addition of a water repellent to prevent its loss in weathering. Although treating military canvas and wood takes most of this chemical, it has been introduced by Cuprinol, Interchemical, and others as a hardware store item for use by house owners, nurserymen, and farmers.

On the reverse side of the ledger, copper naphthenate stiffens fabrics, colors them, has an unpleasant odor, and bleeds through paint. In spite of these disadvantages, it still has no competitor that will match it for both cost and effectiveness.

The following formula, a battle-proved veteran of the war, employs 0.64% copper as copper naphthenate in a rot-proof, water-repellent, fire-retardant, olive-drab coating for tentage and other service canvas:

Chrome orange	2%
Modified phenol formaldehyde (Beckacite 1123)	4%
Tricresyl phosphate	1.5%
Chlorinated paraffin (44%)	15%
Chlorinated paraffin (64%)	4%
Copper naphthenate (8% Cu)	8%
Aluminum stearate	0.5%
Chlordiphenyl (Arochlor 1254)	1%
V.M.&P. naphtha	40%
Iron oxide, yellow	7%
Limestone, ground	8%
Mica, ground	3%
Antimony oxide	6%

COPPER-8-QUINOLINOLATE

Perhaps the most interesting newcomer to the industrial preservative field is copper-8-quinolinolate. This amazing chemical, selling for as much as $13 a pound in certain formulations, has replaced copper naphthenate, which sells for 25¢ a pound, in a number of specifications. The reason is its unusual protective properties.

Practically no other compound known will completely inhibit mold growth in as low a concentration—1-2 parts per million in laboratory media. When it is further considered that this compound is non-toxic to humans and practically insoluble in water, it becomes apparent why it has been able to hurdle the price gap.

Place in the Sun: Discovered in the search for new, effective fungicides after Pearl Harbor, copper-8-quinolinolate was carefully and methodically developed by Paul G. Benignus in the Monsanto laboratories. In its thorough evaluation it was found to be resistant to the deteriorating effect of sunlight. This was most important because many copper compounds had the effect of tenderizing cotton fabric, due to the catalytic degradation of cellulose under the influence of actinic radiation. Thus, certain copper-treated fabric degraded more rapidly in sunlight than the untreated control, a most unsatisfactory condition.

Copper-8-quinolinolate is odorless and has a characteristic yellow-green fluorescent color. Its greatest drawback has been its insolubility in common, cheap solvents. In fact, it has no appreciable solubility in any solvent, and originally had to be applied as a liquid suspension of the powdered compound or precipitated on the cloth by immersing it in baths of copper acetate and 8-quinolinol.

A few years ago, however, the whole solubility picture suddenly changed. In one of the neatest chemical tricks of the decade, Victor Kalberg, chief chemist for colorful, book-writing Otto Eisenschiml's Scientific Oil Compounding Co., solubilized copper-8-quinolinolate. The Cunilates, as Scientific Oil calls its patented solubilized "copper-8" formulations, are soluble in the same cheap solvents as copper naphthenate and still retain the desirable properties of copper-8-quinolinolate. As an unexpected bonus, it was found that the solubilized copper-8 was even more potent against fungi than the parent material.

In certain applications, e.g., vinyl raincoating, solubilized copper-8 is specified because it is the only fungicide that will satisfactorily control mold growth. Whether the solubilized compound is more effective because of its reduced particle size or because of some more profound reason, has not yet been explained. Solubilized copper-8 is an excellent mildew preventive for paints but can only be used where its color does not interfere. Paints in food plants which have been dosed with this non-toxic preparation have been kept free of mildew.

Dollars in It: Other companies with copper-8 preparations include Nuodex (Quindex) and Interchemical (Milmer Dispersion). (Milmer 1 is Monsanto's trade name for copper-8-quinolinolate.) With production in the last year as high as 60,000 pounds a month, and copper-8 at $4.25 a pound, and the solubilized product around three times that price, the dollar volume explains the interest many companies have shown in this compound.

Copper-8 is made by reacting a copper salt, such as copper acetate, with 8-quinolinol (8-hydroxyquinoline). The latter, an excellent fungicide in its own right, was introduced as an antiseptic and disinfectant called Chinosol by the German firm of Fritsche and Co. in 1895. The 8-quinolinol forms a salt with copper through its hydroxyl group and then chelates with the copper through the quinoline nitrogen. Chelation with copper gives rise to a stable, insoluble compound which is a stronger fungicide than 8-quinolinol itself. To make the solubilized copper-8, Scientific Oil cooks the copper-8 with a metallic soap such as aluminum or cobalt stearate.

Some companies are now offering a solubilized copper-8-copper naphthenate combination to reduce the cost and compete with less expensive fungicides.

Shade Cloth Saver: Another copper newcomer is Dow's copper 3-phenylsalicylate. This compound was developed primarily for awnings, tarpaulins, shoe liners, shade cloth; is an effective rot preventive which does not accelerate deterioration of cellulose by sunlight. It has a yellow-brown color and practically no odor. Application is by emulsion or the two-bath process with a water-repellent binder to improve the resistance to severe leaching.

U. S. Patent 2,521,424 proposes the copper acetylides as effective fungicides for paints and other coatings. They have one major drawback: They explode! The inventor, however, points out how this can be prevented by diluting the acetylide with an inert carrier such as bentonite.

ZINC AND MERCURY

While zinc compounds are not as powerful fungicidally as those of copper, they have the advantage of being colorless. This property accounts for zinc naphthenate's use in awnings and textiles where copper's blue color would be objectionable.

Zinc oxide is an important ingredient in building mildew resistance into paints. Serving both as a mold inhibitor and pigment, it also helps to physically condition the paint film for mildew resistance. In the agricultural field zinc adds extra crop protection in certain organic combinations where copper may burn the foliage.

Zinc chloride and chromated zinc chloride are stand-bys in the wood preservation field, in applications where resistance to leaching is not

essential. Adding copper to the complex of zinc and chromium is a recent development that powers the preservative punch of this old-line product. Cellu-san (Fungitrol Chemicals), composed of the zinc salt of high molecular weight alkyl sulfates together with water repellents, is put out as a colorless, odorless preservative for berry boxes, fruit baskets and other wooden containers used in the food and beverage industries.

No Cause for Alarm: The organic compounds of mercury are among the most active microbial inhibitors that have ever been found. The phenylmercurics are about ten times as effective against both bacteria and fungi alike as the well-known bichloride of mercury. And this class of fungicides would enjoy wider application except for the association of mercury with human poisoning.

While caution should be the watchword in using all poisons, there is no need for unnecessary fear of mercury fungicides. Three phenylmercuric salts —the nitrate, the borate, and the picrate—have been approved by the American Medical Association for use in open wounds and other applications to the body. The External Products Research Institute has provided illuminating information regarding the physiological fate of mercury. In animal experiments it was shown that, contrary to general opinion, mercury is not stored anywhere in the body in material quantities and that even after heavy and prolonged absorption the total amount of mercury in an animal's body is less than one fatal dose. All body tissues and most foods contain mercury, and human excreta normally contains about 20 micrograms of mercury a day.

Although they are expensive—$5.25 per pound—the low conectration necessary for mildew control permits economic use of organic mercurials in a wide assortment of products from face paint to house paint. For slime control in paper pulp processing, organic mercurials are accepted because they are active against both the bacterial and fungal compounds of the slime. Mallinckrodt's Pyridose, pyridylmercuric stearate which is unique among the organic mercurials because of its high water-solubility, is sold as a slime control agent.

Stain Prevention: Sap stain of freshly cut lumber, caused by blue or black fungi, can be prevented by the mercurials. DuPont's IN-2555, a 10% solution of phenylmercuric oleate, is widely used for this purpose because the oleate anion contributes valuable solvency in cheap petroleum solvents.

BREAD MOLD is prevented by the addition of propionates.

For mildew resistance in oil-based paints, the oil-soluble phenylmercuric oleate, phenylmercuric stearate, and cresolmercuric naphthenate have been popular. They dissolve directly and replace the old bichloride of mercury tablet that had to be mulled in oil before addition to the paint. Since they are oil-soluble, however, they are more easily absorbed by the skin and can cause irritation when used in high concentration.

Products of cork, rubber, paper, wood, leather, and wax call on organic mercury for protection from fungi. On the other hand, mercurials are of little value in wool, casein paints, and cotton in contact with the soil.

PHENOLICS

In the realm of the purely organic fungicides, the phenolics are of greatest commercial consequence. They include the chlorinated, brominated, nitrated, phenylated, and benzylated derivatives of phenol, cresol, and xylenol, as well as other structures related to phenol. Phenol, itself, is not a strong fungicide but substituent groups in the ring step up the toxicity to molds. The Dowicides are a series of chlorinated and phenylated phenols and their sodium salts. They include phenylphenol, chlorophenyl phenols, trichlorophenols, tetrachlorophenol, and pentachlorophenol. The phenols are used in organic solvents while the sodium salts are water soluble.

Big Bertha: Heavy artillery of the phenols is pentachlorophenol (Monsanto's Santophen 20, Dow's Dowicide 7). "Penta" is a powerful, yet cheap fungicide which is soluble in petroleum oils, Proven only recently as a wood preservative, 2,688,614 pounds were used for pressure treatment of forest products in 1949 and the consumption has increased markedly since that time. After the solvent oil has evaporated, lumber treated with pentachlorophenol is clean and paintable, the chemical imparting no color.

The war shortage of creosote was probably the primary factor in helping penta into prominence as a wood preservative. But national promotion aimed at stimulating demand on the part of small users, the farmer and home owner, has been eminently successful.

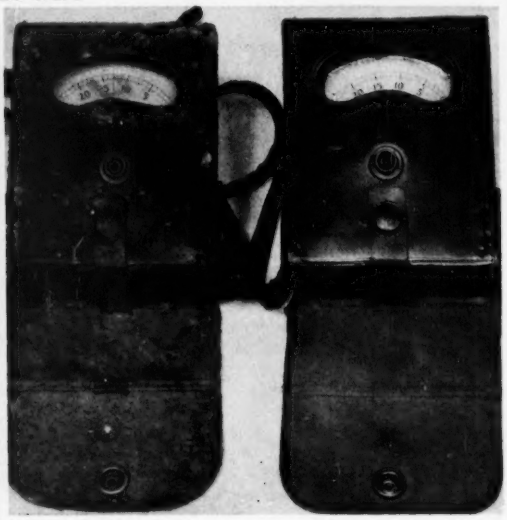
While penta is very resistant to leaching from wood, it is leached fairly readily from cloth. For that reason, plus its susceptibility to photochemical breakdown to yield hydrochloric acid, it is not an ideal textile preservative. In addition to wood preservation, more successful uses of penta and its sodium salt are in paper mill sanitation, preservation of adhesives and rubber latex, and mold-proofing water-type paints. Pentachlorophenol is toxic to humans and will burn skin and eyes if proper precautions are not taken in handling it.

In general, the substituted phenols have the same failings as penta when it comes to weathering of textiles. An exception is dihydroxy-dichloro-diphenyl methane, known as Fungicide G-4 or dichlorophene (Sindar). Making its debut during the war, this compound was snatched up by the Military for its combination of desirable properties: lack of color and irritation to the skin, marked inhibition to fungi, and resistance to leaching.

Long-time Occupation: The inventor of G-4 fungicide, lanky William Gump, is no novice at fashioning profitable molecules: the American woman of today is sweet and fresh the clock around thanks to his hexachlorophene (trade marked G-11 by Sindar), the active ingredient in Dial and other deodorant soaps. Several times the cost of copper naphthenate, G-4 earned its way in certain specialized applications.

Early in the war when the Luftwaffe was spotting Allied gun emplacements with uncanny accuracy, Glenn A. Greathouse, the early-rising director of the National Research Council's Prevention of Deterioration Center, suggested that the metal-containing preservatives used on the guns' camouflage nets were at fault. With infrared cameras, the Germans could easily see the camouflaging as distinct from the surrounding, untreated landscape. When the metallics were replaced by all-organic preservatives such as G-4, the Supermen lost their super-vision. In the present preparedness program G-4 is being produced at a rate of 500,000-1,000,000 pounds a year.

MILDEW GROWS on untreated portion of book; G-4 fungicide keeps other side free from deterioration.



ARMY EQUIPMENT must stand up in tropical areas. The "clean" meter was treated with p-nitrophenol.

Para for Leather: Paranitrophenol is another large-volume phenolic preservative. An estimated 60,000-80,000 pounds a month is being consumed, most of it in quartermaster specifications for military shoes and leather goods. Since it is used almost exclusively to prevent mold growth on chrome-tanned leather goods, the yellow-brown color of paranitrophenol is no drawback. Leaching is prevented by the greases and waxes used in processing the leather. Application is at the rate of 0.3% based upon the weight of the leather. Investigations in tropical storage of leather at the Marine Corps Depot have led to the following treating formulation:

Paranitrophenol	2%
Silicone resin	10%
Rectified tar oil	5%
Neatsfoot oil	15%
Cyclohexanone	10%
Trichloroethylene	58%

The British have long been known for their high quality woolen goods. In being shipped to markets all over the world, they frequently became mildewed and unsalable. This problem was handed to workers at the Shirley Institute in England who soon discovered that phenol was not effective, beta-naphthol reacted with fungus products to form dyes, and other then known fungicides were also unsatisfactory.

Service with Salicylanilide: In 1928, after considerable testing and synthesis, they discovered that the reaction product of aniline and salicylic acid—salicylanilide—had the qualities they were seeking. An excellent product, salicylanilide imparts no color or odor, has low toxicity to humans, and is effective against molds at a low concentration. Under the trade name of Shirlan (Du Pont), salicylanilide has been featured as a textile preservative.

When a search was made for a fungicide to incorporate in lacquer to coat electronic equipment, salicylanilide again demonstrated its merits. It did a satisfactory job at concentrations of 10-15% of the lacquer, and did not cause electrical leakage or corrosion. A large part of the estimated 5,000-20,000 pounds of Shirlan sold per month goes into this newer application.

AMINE DERIVATIVES

A glance at the patent literature of the last two years will show considerable interest in the salts, complexes, and other reaction products of amines for use as industrial fungicides. Nuodex patents—U. S. 2,471,339; 2,526,892; and 2,519,924—describe amine salts as fungicides. The first of these refers to long chain amine salts such as the dodecylamine lactate and salicylate. These compounds, like other surface-active amine salts, act against both bacteria and fungi and have been promoted in a household germicide and fungicide.

The second of these patents refers specifically to the dodecyl amine salt of pentachlorophenol which is cited as a preservative for paints, especially casein paints. The third patent covers quaternary ammonium salts of oil-soluble organic acids such as oleic and naphthenic.

Heterocyclic quarternary ammonium pentachlorophenates are the subject of U. S. Patent 2,541,961 to Rohm & Haas. A compound of this type, Hyamine 3258, was used to some extent during the war to treat cotton thread. Although a good fungicide and substantive to cellulose, it was restricted in its applications because of photochemical breakdown.

Rosin Moves In: In recent years, Hercules Powder Co. has been developing markets for its rosin amines. In U. S. Patent 2,513,429 the rosin amine salts of phenols, such as pentachlorophenol, are claimed. These phenoxides are said to be free from blooming, bleeding, and crystallizing and are said to protect wood, textiles, leather and paint from fungi in 0.01-3.0% concentration.

Complex salts of rosin amines with metals such as copper and zinc are the subject of U. S. Patent 2,492,939. Fungicides of this type are claimed to be especially useful in fireproofing compositions because of their stabilizing action on the chlorinated paraffin.

Inorganic copper ammonium complexes such as cuprammonium fluoride, Protella SB (Albi Chemical), have been used extensively as textile preservatives.

The mercury-amine complexes are also highly active fungicides. The fabric fungicide phenyl mercuri triethanol ammonum lactate, Puratized N5DS (Gallowhur), is a water-soluble quaternary due to the hydrophillic ethanolamine groups but, when dried on the fabric, it becomes insolubilized in the fibers as diphenyl mercury. Other amine complexes with mercury

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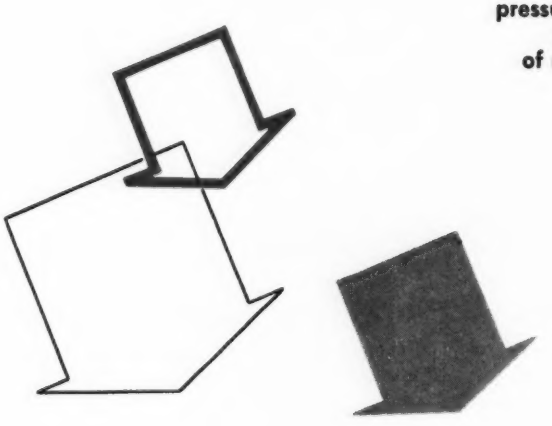

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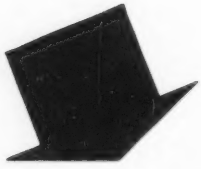
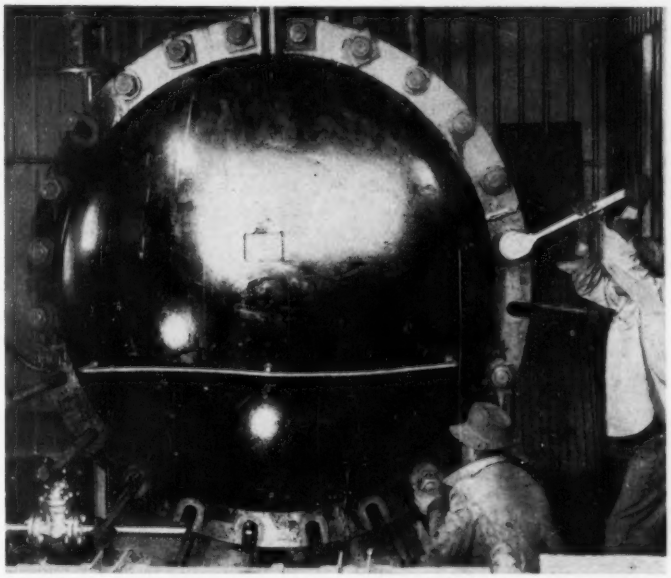


are to be found in U. S. Patent 2,536,750 (to Pittsburgh Coke & Chemical Co.) and U. S. Patent 2,524,547.

Big in Agriculture: The reaction of amines with carbon disulfide gives the very important dithiocarbamic acid fungicides. These compounds are insolubilized in the form of metal salts, as for example zinc dimethyldithio carbamate, Milban (Du Pont), but the insolubility of the latter has made difficult its use in impregnating materials.

The greatest market for these compounds has been in the agricultural rather than the industrial field, where the ethylene diamine reaction product, Dithene D-14 (Rohm & Haas) has attained tonnage-scale production. Ethylene diamine condensation products and formulations of them for treating leather, fur, wool, coated fabrics and wood are given in U. S. Patent 2,523,177 to the Standard Oil Development Co. In Carbide and Carbon's glyoxalidine fungicides, ethylene diamine is condensed with carboxylic acids. A potent fungicide for wood, leather, and wool is made by treating diphenylpiperazine with nitrous acid according to U. S. Patent 2.545.146 recently awarded to Standard Oil.



LUMBER is impregnated with pentachlorophenol. Cylinder is filled with oil solution of preservative, which an electric pump forces into cells of the wood.

OTHER ORGANICS

Fashions in fungicides have developed along certain lines. The discovery that certain rubber accelerators were also good fungicides was a profitable line of attack that has put many of the rubber companies in the fungicide business.

Prominent rubber accelerators that are also prominent fungicides are zinc dimethyldithiocarbamate (Milban, Zerlate), tetramethylthiuram disulfide (Arasan), mercaptobenzothiazole, and tetrachlorobenzoquinone (Spergon). (As rubber accelerators, they are known under other names such as Methasan, Trads, Captax, and Chloranil, respectively.) The dithiocarbamates and tetramethyl-thiuram-disulfide, which is the disulfide of dimethyl-dithio-carbamic acid, have been controlled by Du Pont under the Tisdale patent which expired in 1951.

The discovery of the fungitoxicity of Spergon (Naugatuck Chemical) led to the investigation of other substituted quinones. Phygon (also Naugatuck), 1,4-naphthoquinone, is an agricultural fungicide of considerable merit. Menadione (Velsicol), 2-methyl-1,4-naphthoquinone, and paraxyloquinone and parathymoquinone as well have been shown to be among the most effective fungicides for protection of army leather instrument cases that require preservatives free from mercury and halogens. In U. S. Patent 2,475.288 the United States Rubber Co. claims a number of substituted quinones suitable for preservation of fabrics.

Enviable Combination: Not a quinone but a pyran ring diketone is dehydroacetic acid, known as DHA (Dow). Dehydroacetic acid is a fungicide with certain enviable properties. It is odorless, colorlesss, tasteless, and low in toxicity to human tissues. Although it is somewhat volatile, the sodium salt, which is formed through enolization of the carbonyl of the acetyl side chain, has no appreciable vapor pressure at ordinary temperatures.

A recently developed product, DHA is pointed toward outlets that can best exploit its unusual physical properties. These are in cosmetics, where 0.1% will prevent microbial decomposition in many pharmaceutical formulations; in dips or sprays for fruits and vegetables, where 0.05-0.20% retards mold on products in storage or shipment; and in wax paper wrappings for bread and other foods, where 1-3% based on the weight of wax will generally prevent mold formation.

In the case of wrapped bread, it was found that direct contact between the bread and the wrapper is necessary for inhibition of the mold. From the extensive toxicological data Dow has amassed, it appears that DHA is suitable for certain uses in the food industry but probably not for incorporation in the foods themselves in any appreciable quantity. One food in which DHA has been found to be ideally suited as an ingredient is the warfarin rat-killing bait. For ready-mixed bait to keep without spoiling in storage it must be mold-proofed, yet the inhibitor must be so low in taste and odor as not to make the animal bait shy. A synergized form of DHA trade named Vitane has been developed by Fumol Corp. *(CW, Nov. 24, '51)* for this application.

Exception in Esters: Although esters as a group are not notable for their antifungal potency, the esters of parahydroxy benzoic acid are exceptions. They are more inhibitory than either benzoic acid itself or the unesterified parahydroxy benzoic acid. In the drug and cosmetic trade, where they are used in lotions, creams, jellies and ointments, they are known as the Parasepts (Heyden). For preservative uses, 0.1-0.2% based upon the weight of the finished product is recommended. The methyl ester is employed in aqueous preparations, whereas in oil bases, the butyl or benzyl esters are used.

Another family of fungicidal esters are the aliphatic esters of trichlorophenol. The esters are not as powerful fungicidally as the free phenol, but neither are they as toxic or irritating to the skin. Trichlorophenyl acetate, offered as a seed disinfectant called Seedox (Sindar), is said to show promise as a fungicide for varnishes, lacquers, and vinyl plastics. Cresatin (Sharp and Dohme) is a volatile ester, meta cresyl acetate. Mixed with ethyl cellulose and forced into aluminum

capsules with small openings to allow slow evaporation, Cresatin has been used in military instrument cases to prevent fungal damage to the instruments.

Tops in Food: In the food industry, benzoic acid still holds sway as the major food preservative. The Federal Food and Drug authorities are rigid on new materials to be incorporated in foods and, in general, the industry has turned from chemical to physical measures. Heat sterilization, cold storage, ultraviolet light, air filtration, high frequency radiation, and high voltage electric discharge are among the non-chemical methods of keeping microorganisms in food from getting out of hand.

To prevent bread from molding, particularly during the summer months, bakers now use 0.3% of Mycoban (Du Pont) in the flour. Mycoban may be either the sodium or calcium salt of propionic acid. The propionates do not completely inhibit the growth of bread mold, but, in effect, they accomplish the same purpose by retarding mold growth well past the fresh life of the bread.

WILL IT MOLD?

Cellulose is not attacked by some molds but is completely destroyed by others. Considerable interest has been centered on chemical modifications of cellulose to prevent fungus deterioration of cotton and wooden materials. Processes for acetylation of cotton and wood have been worked on extensively at the U. S. Department of Agriculture's Southern Regional and Forest Products Laboratories, respectively. The greater the degree of acetylation, the more immune the cellulose becomes. The economics of the process appears to control its usefulness. For items of great replacement cost the extra processing would appear to be justified.

A process patented by Joseph Bancroft and Sons Co. provides for fungus-proofing cellulose fibers by treating them with an aqueous solution of phosphoric acid and urea, and curing 2-30 minutes at 340-375 F.

Washed and absolutely clean wool is not susceptible to mold growth. Thus clean clothes are less likely to mildew than worn clothes. But absolutely clean wool is seldom found; therefore treatment is required. As with leather, which is also proteinaceous, the mold does not attack the substrate itself, but damages by staining the woolen cloth. In the case of leather, careful examination has shown that the leather is not damaged directly by molds but, rather, indirectly by moisture, through the removal of water-proofing greases, waxes and oils by the growth of fungi.

HOUSEHOLD SPECIALTIES provide additional outlets for mildew preventives.

Resistant Synthetics: Many synthetic resins do not support mold growth. Examples are urea-formaldehyde, ethyl cellulose polystyrene, cellulose acetate and chlorinated rubber. Where vinyl shower curtains and raincoats are found to mold, the plasticizer is usually responsible. Vehicles containing vegetable oils, casein, oil-rich alkyds, and nitrocellulose have been found subject to mold proliferation. Natural rubber latex is readily attacked but vulcanized rubber and synthetic elastomers are quite resistant to fungi. The compounding materials used can influence the susceptibility but where decomposition does occur, it is generally due to the activity of bacteria rather than fungi, as in the case of leather and wool.

Etched glass lenses in optical equipment in the tropics has led to much debate on whether glass supports fungus growth. The consensus now is that the mold grows on organic dust on the lens and its metabolic products etch the glass.

The presence of mold in sterilized instrument cases is sometimes blamed on tiny insects such as mites. Indeed, mold growth is often associated with these insects. There is a question as to whether mites carry mold spores with them, as bees transport pollen, or whether they go to the fungus because they can feed upon it.

In Africa, a rash of clock stopping was traced to the mold-mite cycle. The tiny mold-eating mites infested chronometers where their hard, crystalline excreta stopped the works. A

fungistatic varnish applied to the clock parts happily solved the problem.

The unsightly black mold on masonry buildings in the South results from an algae-mold cycle. The green algae, requiring no organic matter for its growth, becomes established on moist masonry surfaces. The black mold is a secondary infection, living on dead algae. One-tenth per cent of mercurous chloride in a cement paint has been shown to control this.

RETAIL SPECIALTIES

The retail merchant has not been overlooked in the search for outlets for fungicidal products. Mil-Du-Rid (Interchemical), a household proprietary sold in drug stores and groceries for a number of years, has the composition 2% phenylphenol, 3.5% isoproxyl alcohol, 4% soap, 5% mineral oil, 85.5% water and retails at 89¢ for the pint and $1.59 for the quart.

Leveled at the same outlets, Spandy (Coughlin) is 39¢ for 8 ounces and is featured as a disinfectant, fungicide, and deodorant. It contains as active ingredients 0.4% dodecyl lactate, 0.4% dodecyl salicylate and 4.2% alcohol.

Another household mildew preventive, Resco (Research Laboratories Corp.) comes with attached plastic sprayer in a 12-ounce bottle selling for $1.39. It is claimed to be nonpoisonous, non-irritating and nontoxic and contains 2% lauryl-dimethylbenzyl amine chloride.

Cuprinol has four products for the hardware trade that bear its name. No. 10 Green contains 30% copper naphthenate, 10% water repellent, and 60% Stoddard solvent. No. 20 Clear is based upon 30% zinc naphthenate, while Brown Stain No. 70 contains 10% coal tar derivatives, 18.5% copper naphthenate in oil solvents. Save It or No. 45 Clear, is a solution of 1% orthohydroxy benzanilide. The first three products are formulated for use on wood, rope, sails and similar products. Save It treats leather, cloth, and other items. All four products have the same tag of $1.75 per quart, $4.70 per gallon.

For paints, you need merely Ad-It (Nuodex). "It" is 50% cresol mercuric naphthenate in a 1-ounce bottle. No measurement is necessary—the total contents of the 67¢-bottle are added to a gallon of paint.

To discourage mildew in enclosed areas, volatile inhibitors (trioxymethylene and paradichloro benzene) and air dehumidifiers (calcium chloride and silica gel) are available.

RESEARCH . . . .

Threat From Abroad

Impact of foreign competition in apparatus and instruments is reverberating at the research level.

Reason: Sales of "bread-and-butter" items, which finance a good part of instrument research, are taking a beating.

Result will be a change in development emphasis—to electronics and high-grade products not manufactured abroad.

This week, the Scientific Apparatus Manufacturers Association cocked an apprehensive ear to rumblings from its membership, came forth with an ominous forecast: "In the face of overwhelming foreign competition in bread and butter items, scientific instrument manufacturers may be forced to curtail essential research and development."

The crux of the Association's argument is this: American manufacturers simply cannot compete with their European and Asiatic counterparts in the goods—microscopes, binoculars, cover glasses, etc.—which normally pay the freight for new instrument development.

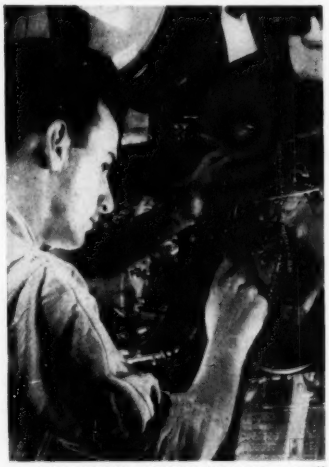
Domestic binoculars retailing at $186 must compete with the Japanese product at $64. Not long ago, the Army bought $50,000 worth of Italian microscopes at $319 each; the lowest domestic manufacturer's bid was $409. Germany sells cover glass at a price well below domestic manufacturing costs.

Cheap foreign labor is the obvious explanation for the gap between domestic and foreign optical instrument costs. Labor accounts for about 70% of production costs for most instruments. Moreover, instrument manufacture usually isn't a mass production operation. Foreign methods are comparable to ours and no amount of capital expenditure will speed up the skilled manual operations that go into the making of an instrument.

In plain words, the Japanese and Germans make them as fast as we do—and a whole lot cheaper.

Tear for Torquay: What to do about the worsening situation is a question that doesn't leave instrument manufacturers speechless. They believe higher tariffs are part of the answer, weren't very happy over Torquay. But tariffs can't make up the entire differential. Import licensing* and other restrictive import measures would also be looked upon with favor.

Although the proposed solutions may draw fire from many quarters, there's no denying the problem. Fortunately it's not as bad with every one as it is with optical instrument manufacturers. Little foreign competition is being felt here in electronic equipment. Germany is gaining its former prominence in lenses, but still isn't electronically minded. The same is true, to a lesser extent, of Japan. Recently, however, a number of Japanese electronic instruments have popped up on importers' lists.

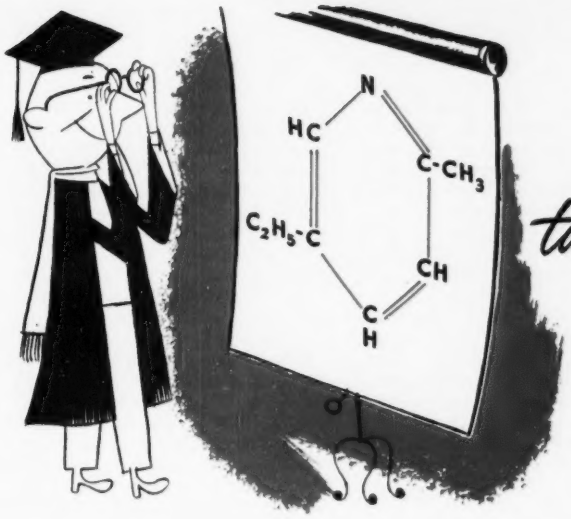


INSTRUMENT RESEARCHER: He'll be taking a new tack.

Infra-red equipment also is holding it's own at home and in some cases is even making headway in foreign markets. The reason is simple: The American-made instrument is generally superior. And at least one domestic manufacturer is set up for quantity production—still non-existent abroad.

Custom-made optics and high-grade products in general also are faring well in home markets. Here, in contrast to more popular equipment, cost isn't the prime limiting factor. Buyers

* Great Britain licenses all instrument imports. When a foreign manufacturer applies for a license, blueprints and specifications of his instrument are given to British manufacturers who determine whether they can make the instrument. No instrument already made in Britain may be imported.



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Molecular Weight	121.2
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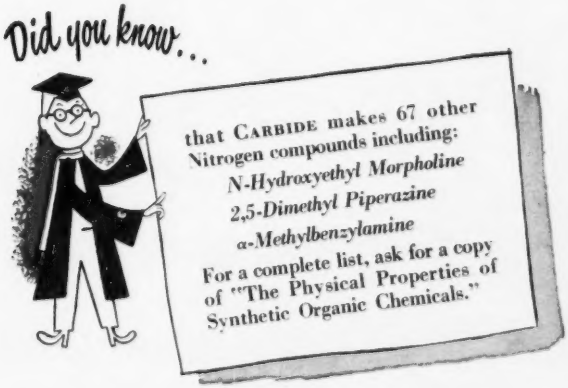
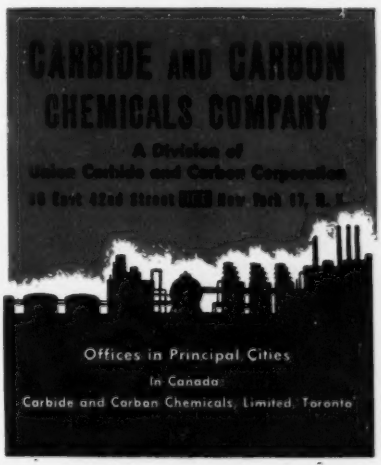




expect these products to be expensive, are more concerned with getting a product of proved high quality than picking up a questionable bargain.

Although electronic and better-quality equipment have successfully countered the threat at home, they have suffered substantial losses in foreign markets. And the situation is nowhere near static at this point. The industry frankly expects stepped-up competition—both here and abroad.

Realizing their plight, instrument makers are changing their research tack to make the most of their known assets. One prominent manufacturer told CW that development emphasis in his firm will be shifted to electronic equipment and special high-grade instruments that are not made overseas. His prediction: "High-grade precision instruments, once exclusively associated with German makes, will become the hallmark of the American scientific instrument industry."

In the last analysis, the industry will probably have to go it alone. But the Government may yet be an unwitting accomplice. The increased instrumentation needs of the rearmament program mean more military contracts, stepped-up research. Unfortunately there's another side: Engineers tied down by military research projects are of little apparent value in the normal scheme of civilian instrument development.

But one manufacturer points out that military contracts enable a company to take on new technical staffers who are then available for consultation within the organization. Moreover, knowledge gained from Government-sponsored projects can often be put to good use in normal commercial operation.

Greenhouse Yields Budding Drug

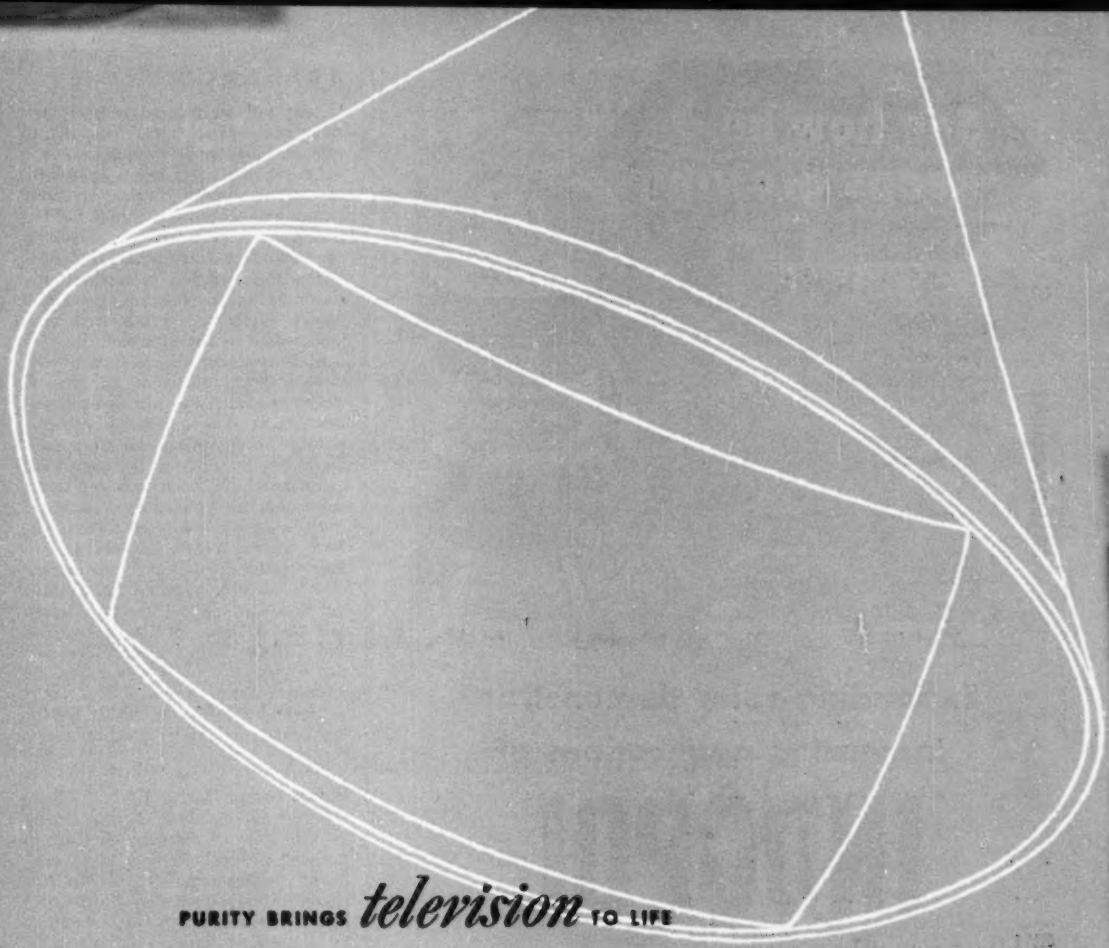
Thanks to the familiar Easter hydrangea plant, Lederle Laboratories Div. (of American Cyanamid Co.) has a promising new antimalarial and a fertile area for further investigation.

Five years of research went into the new drug—a modification of the hydrangea alkaloid. But that's a relatively trifling period next to the 3,000 years that Chinese malaria sufferers have been using its potent alkaloidal precursor.

The search for the new therapeutic agent started during World War II. Lederle researchers were seeking out better antimalarials, took a fancy to the Chinese Ch'ang Shan plant as a source of compounds showing antimalarial activity. Ch'ang Shan roots were a time-honored Chinese malaria remedy, but not very easy to come by in the Western world.

A bit of fortuitous botanical sleuthing turned up an American relative in the hydrangea. With high hopes, the researchers tested hydrangea al-

J. H. WILLIAMS (left): The Chinese had a word for it.



PURITY BRINGS *television* TO LIFE

What makes television work? Many things, of course.

But one of the vital elements in television's magic is a thin coating of phosphor on the face of the picture tube. Turn the switch, and this ultra-pure coating virtually comes to life, particle by particle.

Phosphors must be made from the purest of pure chemicals—their impurities reduced to fractional parts per million. With such requirements, it is natural that the television industry looks to Mallinckrodt as a prime source of extreme purity chemicals for phosphor production. Mallinckrodt also cooperates with the television industry in supplying unusual chemicals for continuing exploratory research.

For 84 years we have successfully supplied the needs of industry for chemicals of high purity, exceptional uniformity, and particular physical form. We shall continue to provide industrial users of fine and hard-to-make chemicals with the best that long experience, progressive research and modern facilities can produce. *Precise chemical processing is our business.*

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• MANUFACTURERS OF FINE CHEMICALS FOR INDUSTRY • SINCE 1867 •

kaloids for antimalarial activity; results were encouraging enough to spur an intensive research effort.

During the Easter season, the active hydrangea alkaloid became available from a number of greenhouses. Chemical analysis revealed the alkaloid's empirical formula to be $C_{16}H_{19}N_3O_3$. Under the direction of research director James H. Williams, the compound finally was synthesized and modified to reduce its toxicity.

Still nameless, the new synthetic now is being evaluated in clinical studies. Lederle says it is many times more active than quinine, is concentrating on improving the drug further. How it will stack up against its antimalarial kin,* both old and new, still is any one's guess.

•

New Amine: A new alicyclic secondary amine, 2,5-dimethyl piperazine, now is available in pilot-plant quantities from Carbide and Carbon Chemicals Co., Division of Union Carbide and Carbon Corp. Potential uses for the compound: in the synthesis of pharmaceuticals, resins, rubber activators and antioxidants, textile finishing agents and boiler treating compounds.

•

Isotope Score: During 1951, the first full year of operation, Atomic Energy Commission's Brookhaven reactor supplied 270 radioisotopes to 26 different research organizations. Not included in these figures are the several hundred radioisotopes used in research by staffers of Brookhaven National Laboratory.

•

Thorium Activity: A study of the analytical applications of 1-(*o*-arsenophenylazo)-2-naphthol-3, 6-disulfonic acid is in store, according to Fine Organics, Inc., which prepared the material at the request of the U. S. Geological Survey.

•

Bigger and Better: A new silver determination may be the significance behind the discovery, by Italian researchers, that the metal is precipitated by mercaptobenzothiazole in ammonia solution. Due to the relatively large molecular weight of the reaction product, small amounts of silver may be determined more accurately than by conventional chloride precipitation. Added advantage: The mercaptobenzothiazole precipitate is stable to light.

•

Research Unification: New laboratories, nearing completion at Verona, Pa., herald the coming of a bigger, more unified research program for

* Among them: Atabrine, chloroquine, primaquine.

RESEARCH . . . . . .

Koppers Co., Inc. G. F. D'Alelio, Koppers' vice president and research manager, says: "Within a few months, a major portion of our research will be centered at Verona and by 1953 we may have nearly 200 chemists, physicists, engineers and technicians working there."

The new facilities will enable the company to step up its work in the fields of coal chemicals, plastics, resins, wood preservatives and metal products. Pilot-plant investigations in chemicals, fuels and process machinery also have been provided for in plans for the new research center.

•

Hormone Boon: More milk, possibly more calves, and a new market for hormones may result from current studies at Michigan State College. Researchers at the College have been probing the effect of progesterone and diethyl stilbestrol implants on unproductive dairy cows. Although much work remains before their findings can be translated to practical farm use, some interesting results now are available.

Two sterile Guernsey heifers were given the hormone treatment. Without calving, both produced over 6,000 pounds of milk and 320 pounds of butter fat over a 300-day period—equaling the performance of normal first-calf heifers of the breed. Milk production also was reinitiated in two 4-year-old non-breeders which ordinarily would have gone to the butcher.

•

Research Money: Du Pont's research awards for the academic year 1952-3 have just been revealed by the company. A total authorization of $510,000* is provided for 75 post-graduate fellowships at 47 universities and grants-in-aid to 15 universities.

Success of the Du Pont awards in recent years has prompted the company to raise its university grants-in-aid from $10,000 to $15,000 a year. Grants are made without strings; recipient universities alone decide the line of research for which the money will be used. Only stipulation: Funds must go solely for fundamental research — commercial objectives are taboo.

•

Soap Note: Lever Bros. of Cheshire, England has recently received a British patent (654,139) describing germicidal soap additives. According to company researchers, the addition of small amounts (up to 6% by weight) of dihydroxy halogenated diphenyl ethers to soaps and detergents confers effective germicidal properties.

* A substantial increase over the 1951-52 Du Pont appropriation of $405,400.

For Elusive and Sensitive PRODUCTS

Finely powdered products will not sift through a Fulton W.P.P.L. Bag. Even moisture or outside vapors from gaseous materials will not penetrate the tough lining of paper or plastic that is laminated with adhesive to the inside of this sturdy bag.

Made of either cotton or burlap, Fulton W.P.P.L. (Waterproof Paper Lined) Bags are ideal containers for export or domestic shipments of hygroscopic materials, and products to be protected from outside influences. Many manufacturers who formerly used rigid containers are finding this tough, flexible, easier-to-handle textile bag a more advantageous and economical package for their products.

Investigation might prove it's the best container for your product. Just drop a line to the Fulton branch nearest you for full information.

Growing constantly in popularity with industry's largest users of paper bags—Fulton's famous Multiwalls. All types—pasted or sewn bottom, open mouth or valve. Fulton makes the Multiwall to fit your product!

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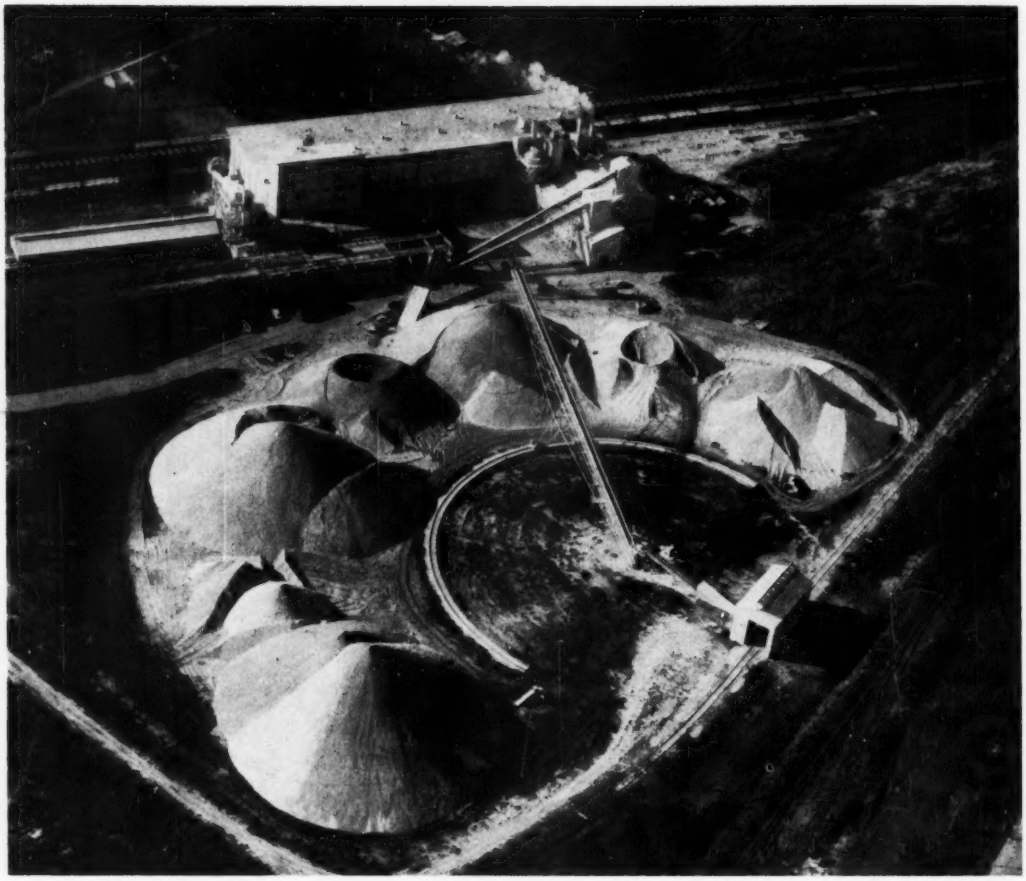
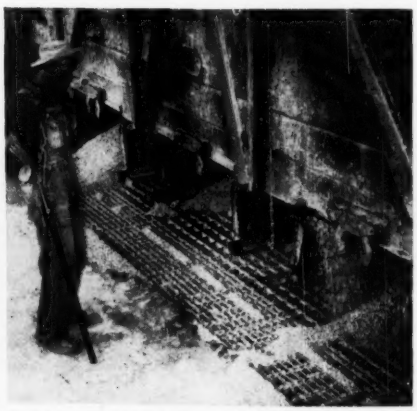


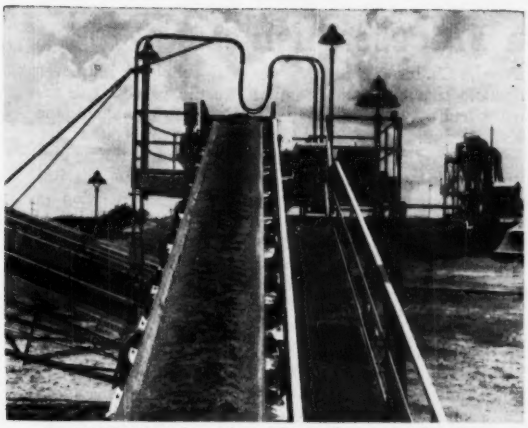
AERIAL SHOT of Cyanamid's wet rock storage plant at Brewster shows stacker at work, makes rock piles look like ant hills.

PRODUCTION . . . . . .

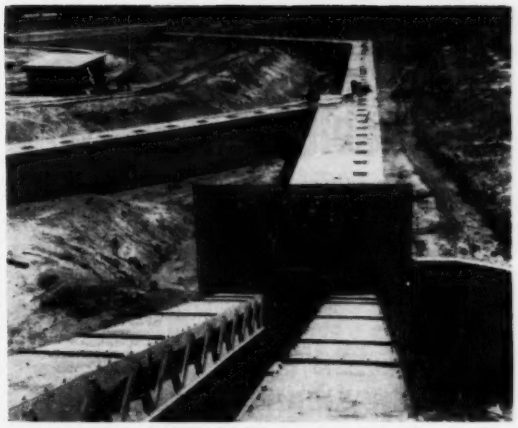
Underground Tunnels for Better Blends



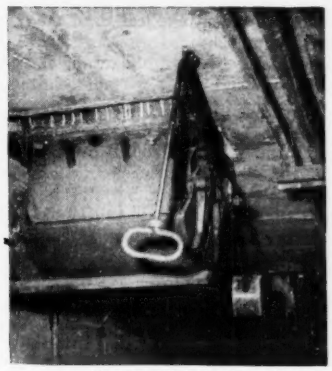
1 WET ROCK ARRIVES in hopper bottom cars and is dropped on the track hopper (right). From the hopper, it is fed to a conveyor belt. Feed rate—currently 600 tons an hour—is being stepped up to 800 tons an hour.

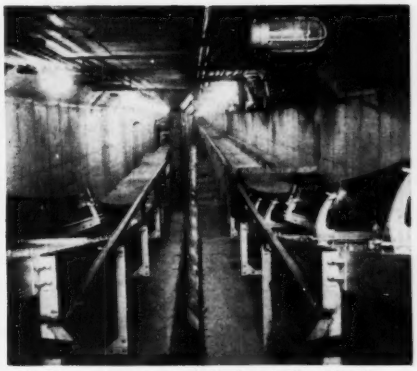


2 CONVEYOR from the track transfers material to the stacker which pivots in a wide semi-circle.

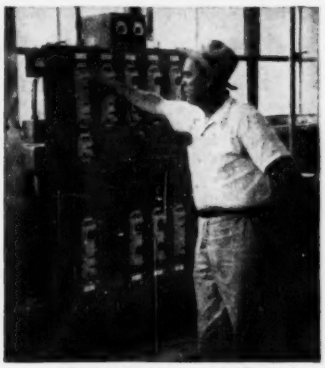


3 STACKER DROPS ROCK on appropriate pile over this underground tunnel built of reinforced concrete.





4 CLAMSHELL GATES (left) in roof of tunnel are controlled electrically. Blending is accomplished by proportioning the desired grades onto conveyors (right).



5 OPERATION is controlled from panel in dumping hopper building.

Fancy systems for conveying rock phosphate are nothing new to the industry, but American Cyanamid has put one in at its Brewster (Fla.) plant which promises to be the last word in storing and blending the wet rock.

Cyanamid reports that its new method—which includes a rotary stacker conveyor and underground tunnels for blending—permits more storage capacity, more accurate blending and more efficient operation of both the storage facilities and mines.

The old system which has been replaced (a concrete bin with reclaiming conveyors) allowed limited storage and blending, also caused delays in handling incoming hopper cars. The new system prevents delays of railroad equipment and means faster service for customers.

6 AT MIDPOINT OF TUNNEL, two conveyors carry the rock from the tunnel to a dual conveyor system entering the drying plant. Thus the rock can be removed from any point (or from several points at once) at any desired rate.

PRODUCTION . . . . . .

$8 Million Process Push

Last week, Hercules Powder Co. broke the news for which whole segments of the chemical industry had eagerly waited: It had decided to build an $8 million plant for making phenol and acetone and para cresol by its process which involves the formation of organic hydroperoxides as intermediates.

The new plant is scheduled to go on stream in 1953. Hercules, however, is not ready to state where the plant will be built. It says only that it will be located somewhere in the Delaware River industrial area and that raw materials, benzene and propylene, will be purchased from nearby petroleum refineries or coke ovens. Terpenes (for the cresol) will come from Hercules naval stores operations in Georgia and Mississippi.

Nor is Hercules disposed to talk about plant capacity. The company reports merely that production of cresol and cymene alcohols will be enough to meet the mounting demands of industry. And production of phenol and acetone "will be appreciable."

Policy Departure: The new plant will mark Hercules' big splurge outside of its two big money makers: naval stores and cellulose. But, even more important, the process will enable the production of phenol and cresol without consuming either sulfur or chlorine. In manufacturing phenol, for instance, Hercules will first produce cumene by the reaction of benzene and propylene. Air added to the cumene will oxidize it to cumene hydroperoxide which disproportionates into phenol and acetone on treatment with acid (*CW, Aug. 25, '51*).

The process, says Hercules, is the result of some fifteen years research. But when it applied for a patent, it found that an equivalent process was being independently developed by the Distillers Co., Ltd., in England. As a result, Hercules covered its right to the process by getting the U.S. patents and patent application of the English firm. The process has since been licensed to B. A. Shawanigan, Ltd. who will build a phenol-from-cumene plant in Montreal.

And even in this country, Hercules is not alone in its decision to by-pass sulfur and chlorine in the production of phenol. For Allied's Barrett and Standard of California will utilize cumene as an intermediate in their phenol plants now abuilding.

EQUIPMENT . . . .

Dynel Covers: Valve and flange covers made of dynel are being marketed by the Mine Safety Appliance Co. (Pittsburgh). MSA says the covers are designed to fit all size valves and flanges, are easily installed and cost only one-third as much as previous covers. The company adds that the resistance and strength of dynel effectively contain sprays resulting from gasket or packing failures in pressurized lines.

•

Airfoil Blades: Tests by Westinghouse show that increased efficiency in a centrifugal fan wheel can be obtained by substituting airfoil blading for conventional bladed fans. Instead of the usual rectangle plates (flat or curved) the bladed cross-section is similar to an airplane wing cross-section. The airfoil blades are more expensive, but Westinghouse says this can be offset by the higher efficiency and consequent savings on horsepower.

•

Slurry Pump: Manton-Gaulin has brought out a Hydrex pump which is said to make possible transfer operations that have been previously considered difficult or impossible. M-G says the pump has been designed to transfer slurries, abrasive or corrosive fluids, and suspended solids.

•

Shelf Dryers: Changes in its vacuum shelf driers are reported by the F. J. Stokes Machine Co. Aimed at lowering costs and increasing efficiencies, the changes consist in making the doors on Stokes 138 chambers of steel instead of cast iron and installing larger sight glasses. Stokes engineers say the steel doors will be stronger, lighter, free from pitholes and will simplify coating and modification.

•

Resistant Gloves: Canvas gloves, coated with a vinyl plastisol, are being sold by Houghton Laboratories, Inc. (Olean, N. Y.). Intended as a protection against corrosive chemicals, the gloves are said to be flexible enough to permit delicate laboratory manipulations, tough enough to stand up under arduous usage by production workers.

•

Bigger Mill: Morehouse Industries (Los Angeles) is selling a new Model B-2000 mill. With capacities up to 1,500 gal. per hour, the new mills incorporate all the features of the Model M and Model B-1400.

tests prove

Gluconic Acid

is the least corrosive!

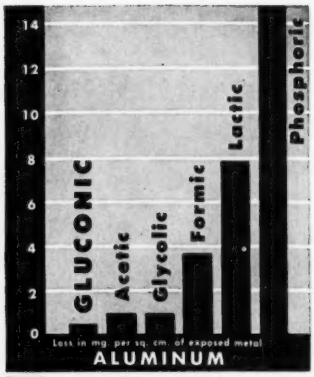
The accompanying graphs show the relative corrosion rates of six of the most widely used mild acids when tested on Monel metal, stainless steel, copper, aluminum, zinc and mild steel. The metals were immersed in 1 N acid solutions for 4 hours at 212°F. In each case, gluconic acid was found to be *the least corrosive of all!*

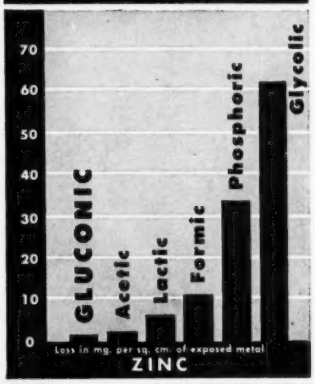
Because of this mildness, gluconic acid is widely used in metal cleaning compounds. Being non-toxic, it is particularly effective in cleaning agents used by the food industry. And in brewing, it is finding increasing use in the prevention of beerstone formation.

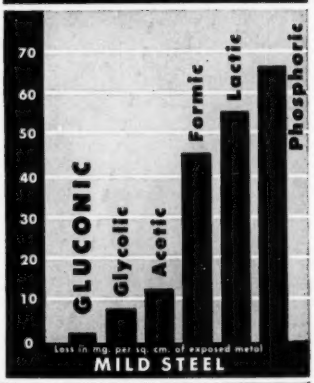
Gluconic acid is also used as an acid catalyst for vat soluble ester printing pastes and acid colloid resins in the textile industry. In addition, it is an effective sequestering agent in textile printing, tanning and industrial water treatment.

Gluconic acid is marketed as an amber, 50% aqueous solution possessing a slight acetous odor. Specific gravity is 1.24 at 25°C.

Write Technical Service Dept. **CW-2** for data, samples and prices.







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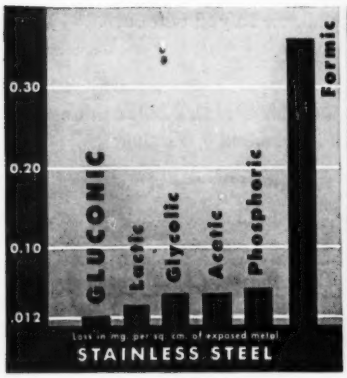

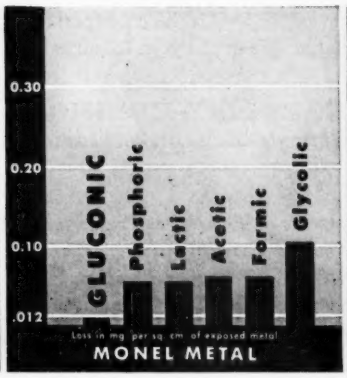

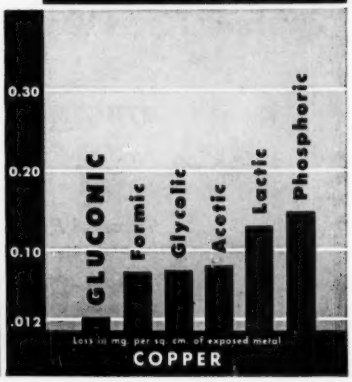

SPECIALTIES . .

Cold Waves, Hot Competition

Thioglycolate-based cold wave preparations have captured the top spot in the permanent-wave business. In seven years, this has zoomed to a quarter-billion-dollar industry.

First patents—apparently encompassing all processes in the cold-wave field—were granted last month, starting a scramble in license negotiations.

A seven-year-old segment of the cosmetic business has swarmed up the ladder of success, now sits at the top of the hair-dressing trade. Unhampered by patent limitations, thioglycolate-based cold wave processes have grabbed a virtual exclusive in the home kit area, and have gained a firm grip on leadership in cold wave preparations for beauty parlors.

E. G. McDONOUGH: A permanent smile now.

Now patents have been granted to Sales Affiliates, Inc. (New York); a new worry has been introduced to an already sadly harried field.

Top seller of the home kits, Toni (claiming at least 50% of the business) is not as yet licensed, although negotiations are said to be under way. But several of the others, notably Procter and Gamble, with second-selling Lilt, and Lever Brothers (4th place Rayve and Shadow-wave), Daggett & Ramsdell (Debutante), Lehn and Fink (Portrait), figured their best bet would be to get a license as quickly as possible. Lever, for example, was licensed even before the patents were granted.

Got Them Covered: New developments, pushed by all involved, failed to get away from the thioglycolates—which are pretty well covered in the recently-granted patents. Neutralizers, used to remove the mercaptan from the hair after the curl has been effected, have been varied: Toni now has Permafix (monohydrated sodium perborate and Calgon), and is introducing for children's hair, Tonette, said to neutralize itself as it dries. Beauty parlors use hydrogen peroxide.

E. G. McDonough, of Evans Chemetics, who invented the currently-used processes, applied for the patents back in '41. Litigation held up the issuance of them for ten years, however, and it was just last month that they were granted (*CW, Dec. 15, '51*. Business and management rights to the patents are held by Sales Affiliates, although Procter and Gamble is assignee, under a vaguely described plan to use them as security for monies Sales Affiliates is to pay P&G.

Booming Business: Thioglycolic acid, key compound in the cold wave process, has lured some 44 manufacturers into a highly dangerous field. Several have been literally blown out of business; only five companies are making it now: Evans Chemetics, said to be the largest producer; Toni (Chicago), a division of Gillette Safety Razor; Summit Chemical (Belleville, N.J.); Halby Chemical (Wilmington); Norco (Philadelphia).

Estimates place consumption of monochloroacetic acid, mercaptan basic raw material, at close to 2 million lbs. Another chemical used in quantity by the home wave kits is potassium bromate; guesses place consumption at ¾ million lbs.

Essentially, there is little difference in home and professionally-given cold waves. Principal variance is that in home kits, potassium bromate is the neutralizer; in the shops, hydrogen peroxide—somewhat more expensive—is used.

In the home wave field, several processes have been offered over a period of years. First kits tried a sulfite process*, but the bad odor and

* Virtually superceded by mercaptan processes, perhaps one remains on the market. Word has it that a Chicago firm recently invested in a sulfite process purchased abroad, unaware of the lack of success this method has had here.

attendant inconveniences prevented volume sales. First of the thioglycolic kits came out in 1943 (Crowning Glory, by Callman, Chicago), followed in mid-'44 by the now top-selling Toni.

Cold wave processes have competition in shops from two other methods. Both of these other treatments require heat to effect the "permanent" curling, and both appear to be losing ground to cold waves. "Machine" waves, utilizing electrically-heated mandrels to fix the curl, and "machineless," which generally use an exothermic redox reaction, lack the convenience of the newer preparation.

In addition, powdered aluminum, required by many of the machineless processes, was hard to get during the war, and when supplies eased in late '45, the cold waves had become well enough established to prevent machineless waving from assuming the position it had originally seemed slated for.

Most of the developments in the field of home permanents have involved shrewd merchandising. With kits for dolls available, and a tight market in twins, there are some who wonder if the tress-treatment promoters are the power behind poodle cuts, which require new permanents about every eight weeks.

Polychrome Packages

A new, economical coating, compounded of starch, clay, pigments, and resins will soon enable drab shipping cartons and other cardboard items to blossom forth in all the hues of the rainbow.

Brainchild of starch producer A. E. Staley Mfg. Co., Decatur, Ill., the novel formulation slashes coloring costs from a previous $1.50-5.00 per 1,000 sq. ft. of cardboard to 51¢ per 1,000 sq. ft. or less.

For example, mill runs show that blue liner can be colored for 30¢ per 1,000 sq. ft. as against $4.80 when conventional methods are used; orange board, for 51¢ instead of $2.55. Low cost dyestuffs used on certain types of board may bring costs to as little as 8¢ per 1,000 sq. ft.

Eye Catchers: Trend-wise packaging experts know that colored cartons are natural eye-stoppers, stand out from drab shelfmates. But the hitch has always been the high cost of inks, dyes, and pigments used in conventional printing-type processes.

So when research men at Staley started looking at cardboard color coating formulations several years ago, they were digging for a prescription that would offer economy, ease of operation, and water resistance.

Measured Mix: And that's just what they've come up with: Brewed with the help of Du Pont's Dyestuff Division, the Staley formulation utilizes inexpensive, on-the-spot-mixed water-soluble aniline dyestuffs rather than the more expensive factory-prepared pigment—contain printing inks now in use.

It's made by preparing a solution of thin boiling starch, adding a clay-containing pigment slurry to it. Titanium dioxide is introduced wherever whiteness and opacity are required.

Good water resistance is obtained by insolubilizing the starch with urea formaldehyde resins and acid salts such as alum, ammonium phosphate, etc. The dye used depends upon the color, light-fastness, and bleed-fastness needed.

Rolling It On: Processing is done by a wire-wrapped roller especially designed to give a smooth, uniform coating to the board. Sometimes a single coat will do the job, but two coats are needed for deep shades, a special opaque base coat for the lighter colors.

A gloss finish coat can be applied if desired, and if necessary designs or printing of a different color can be laid down on the base coat with the aid of special rollers.

Now that the way's been shown, there's no doubt that the reduced costs possible with the Staley process will bring colored cartons within reach of many manufacturers' packaging budgets. Use should increase rapidly, and with it new specialty markets for producers of starch, resins, resin polymerization catalysts, dyes, titanium dioxide, clays, and metallic powders.

Discount Fix

Specialty manufacturers will watch with interest the fate of the Federal Trade Commission's recent order fixing the maximum quantities of goods on which a seller can give his maximum discount price.

To date, the order, as issued, affects only sellers and buyers of auto tires, but it has implications for makers of soaps, detergents, cosmetics, paints, waxes, etc. as well.

The rule fixes a 20,000-lb. carload of tires as the maximum quantity discount unit in the tire industry. As of April 7, the buyer of two, or five, or fifty carloads of tires may be granted no greater discount than the buyer of one.

The same sort of ruling can be applied to any product in any industry if FTC cares to follow through.

TETRASODIUM PYROPHOSPHATE

MONOSODIUM PHOSPHATE

SODIUM ACID PYROPHOSPHATE

ARM-O-FOS (TRIPOLY)

TRISODIUM PHOSPHATE

DISODIUM PHOSPHATE

DRI-TRI (ANHYD. TSP)

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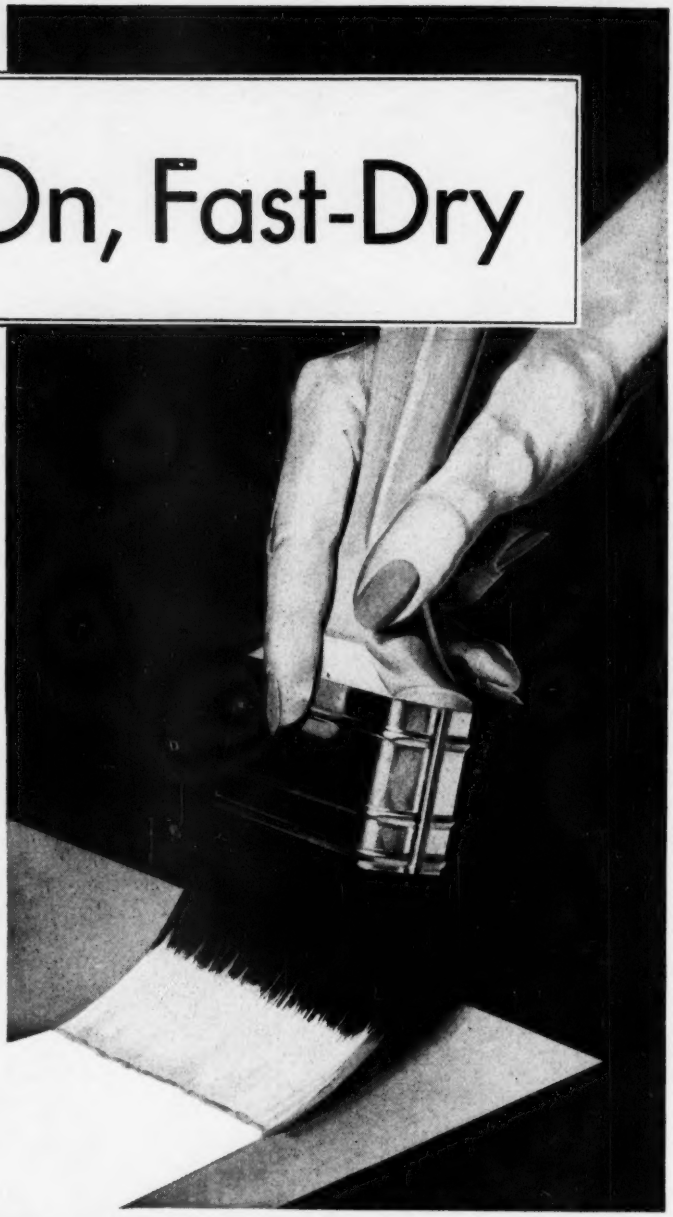

CHEMICAL PROBLEM . . .

. . . to help make enamels that combine fast drying and easy brushing—advantages not always found together in the two types of enamels most used today. One type of enamel brushes easier, the other dries faster.

SOLUTION . . .

. . . a new Hercules resin, Pentalyn® B-56. It reacts chemically with the other paint ingredients to favor neither drying speed nor brushing qualities unduly, but to provide the very best combination of both.

RESULT . . .

. . . enamels that dry fast and are easily applied. Manufacturers find these finishes are also easier to process. They can be made from a wide variety of raw materials and are available in all colors from many well-known paint companies.

Hercules' business is solving problems by chemistry for industry . . .

. . . paper, rubber, insecticides, adhesives, soaps, detergents, plastics, paint, varnish, lacquer, textiles, to name a few, use Hercules® synthetic resins, cellulose products, chemical cotton, terpene chemicals, rosin and rosin derivatives, chlorinated products, and other chemical processing materials. Hercules® explosives serve mining, quarrying, construction, seismograph projects everywhere.

HERCULES

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However, the fact that FTC has waited so long to exercise this Robinson-Patman authority, suggests that it doesn't want to move into the quantity fixing business at all, is half hoping that a sure-to-come court test of the order will go against the provision, and so relieve the agency of a big headache.

Nitrofurazone Hike

First large-scale production of Furacin (nitrofurazone), a furfural-derived pharmaceutical used in the treatment of infections, severe burns, cutaneous ulcers, skin grafts, and certain fungus diseases, has just been initiated by Norwich Pharmacal Co., Norwich, N.Y.

Introduced to the medical profession during World War II, Furacin was used successfully against several types of infected war wounds which had not responded to other medication. Recently, it has also found a market in veterinarian medicine where it has proved an effective feed supplement for the prevention of coccidiosis in chickens.

To date, the drug has been available in pilot plant quantities only, but the new installation (capacity: 240,000 lbs. annually) will be able to supply growing nitrofurazone markets for treatment of both humans and animals.

•

Cereal Binder: Glycerine is now finding use in a compressed cereal bar designed by the Army Quartermaster Food and Container Institute, Chicago. Cereal, sugar, skim milk and shortening are held together by glycerine, 2% of the final mixture by weight.

•

Citrus Storage: Weed hormones 2,4-D and 2,4,5-T are finding use in prolonging the life of lemons. The stem end of the lemon is kept alive and green, preventing internal changes which accompany aging fruit. Increase in lemon storage life from the previous four to six months is claimed by the University of California Citrus Experiment Station.

•

Dog Lather: An aerosol-dispensed dog lather and flea killer is now being market tested by Hilo Co. (Norwalk, Conn.) in New England, New York, and New Jersey. It will go national shortly.

A combination of piperonyl butoxide and related compounds, pyrethrins, and petroleum oil plus a detergent, Hilo Dry Bath ($1.29 for the 5-oz. size) is squirted on the dog,

rubbed into his coat, then removed with a towel. The result, according to Hilo, is a deodorized glossy-coated, flea-free animal.

Since the foam is used without water, the owner need not fear that his pet will catch cold. Hilo recommends the new cleaner for cats and kittens as well as grown dogs and puppies.

•

Non-clog Salt: Another formulation to make table salt free-flowing in humid weather will hit grocery store shelves this April. Diamond Crystal Salt (division of General Foods) will add 2% calcium sulfate, plans to promote product as guaranteed not to get lumpy or clog shaker holes in "any climate in this country." No increase in consumer price is expected.

•

Silicone Masonry Coating: Ranetite Manufacturing Co., Inc. (St. Louis) is distributing a new silicone-based water repellent which can be applied by brush or spray to most types of exterior masonry. It will be available nationally at retail prices ranging from $3.50 per single gallon to $3.25 in 55-gallon drums.

•

Pesticide Protection: Safety in low concentrations (field use only,) of the organophosphate insecticides TEPP and HETP is offered by a new respirator filter-cartridge perfected by Willson Products (Reading, Pa.). Said to be the first respirator approved by the USDA, Willson has designed the new filter to fit interchangeably in its previously developed Agrisol respirator.

•

Lambert Pharmacal Consolidation: Lambert Pharmacal Co., St. Louis, and two of its wholly-owned subsidiaries have recently merged to simplify corporate structure. The subsidiaries, John Hudson Moore, Inc. (NYC) and the Pro-phy-lac-tic Brush Co. (Florence, Mass.), will continue present lines of manufacture as operating divisions of the parent company.

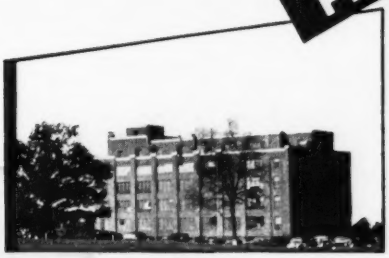
•

Fog-stopper: A liquid to prevent all glass and plastic surfaces from fogging and misting is being produced by Merix Chemical Co. (Chicago). Called Merix Anti-Fog, quart bottle sells for $3.95; single gallons, $13.95; gallons in five-gallon lots, $9.75.

PICTURES IN THIS ISSUE:

Cover (bottom)—Amer. Cyanamid Co.; p. 26 (right)—U. S. Army Corps of Engineers; p. 29—Simpson Photo; p. 30—Interchemical Corp.; p. 34—Amer. Cyanamid Co.

OLIVER PRECOAT FILTER



A Great Filter in a Great Field — Antibiotics!

One of several 8'x10' Oliver Continuous Vacuum Precoat Filters in the big Lederle Laboratories, Pearl River, N. Y. This single division of American Cyanamid Company has eleven Precoats in its plant.

Again Oliver United comes up with the engineering service and the right filter design for handling new and unexplored filtration problems. We refer to the various 'antibiotics' which are making great names for themselves in the field of medicine.

In several plants, on several different products, the Oliver Precoat Filter has proved to be a practical filter for handling the peculiar, almost unfilterable, solids produced in the various processes. The cakes formed are thin, sticky and flow-retarding yet the Precoats handle them effectively and economically. In some instances the Precoats are 'continuous vacuum'; in others, 'continuous pressure.' Either design, they sure are doing good work.

It may well be that your filtration problem doesn't call for an Oliver Precoat Filter (Bulletin 217). Whatever it requires, bear in mind that our engineers will bring to that problem 44 years of filtration experience and many types of filters involving all three classes: continuous vacuum, continuous pressure and batch pressure. We have complete testing facilities to help make the selection the right one for your requirements.

Another Oliver United filter that has already proved its worth in handling 'antibiotics' provides further evidence of Oliver United's broad service to industry. We refer to the Oliver Horizontal Filter. This filter rotates on a horizontal plane with full visibility of feeding, filtering, washing and cake discharging. It is ideal for handling crystalline or coarse products. Bulletin 218 gives the details.

New York 18 — 33 W. 42nd St. Chicago 1 — 221 N. LaSalle St.
Oakland 1 — 2900 Glascock St. San Francisco 11 — 260 Calif. St.
Export Sales Office — New York • Cable — OLIUNIFILT

FACTORIES:
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Oakland, Calif.

OLIVER UNITED FILTERS DUFF INC. **inc.**

WORLD WIDE SALES, SERVICE AND MANUFACTURING FACILITIES

CANADA
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Orillia, Ontario

MEXICO & CENT. AMERICA
Oliver United Filters Inc.
Oakland, Calif.

INDIA
Dorr-Oliver (India) Ltd., Bombay

EUROPE & NORTH AFRICA
Dorr-Oliver S. A. Brussels
Dorr-Oliver S.N.a.R.L. Paris
Dorr g.m.b.h. Wiesbaden (16)
Dorr-Oliver Co., Ltd., London, S.W. 1
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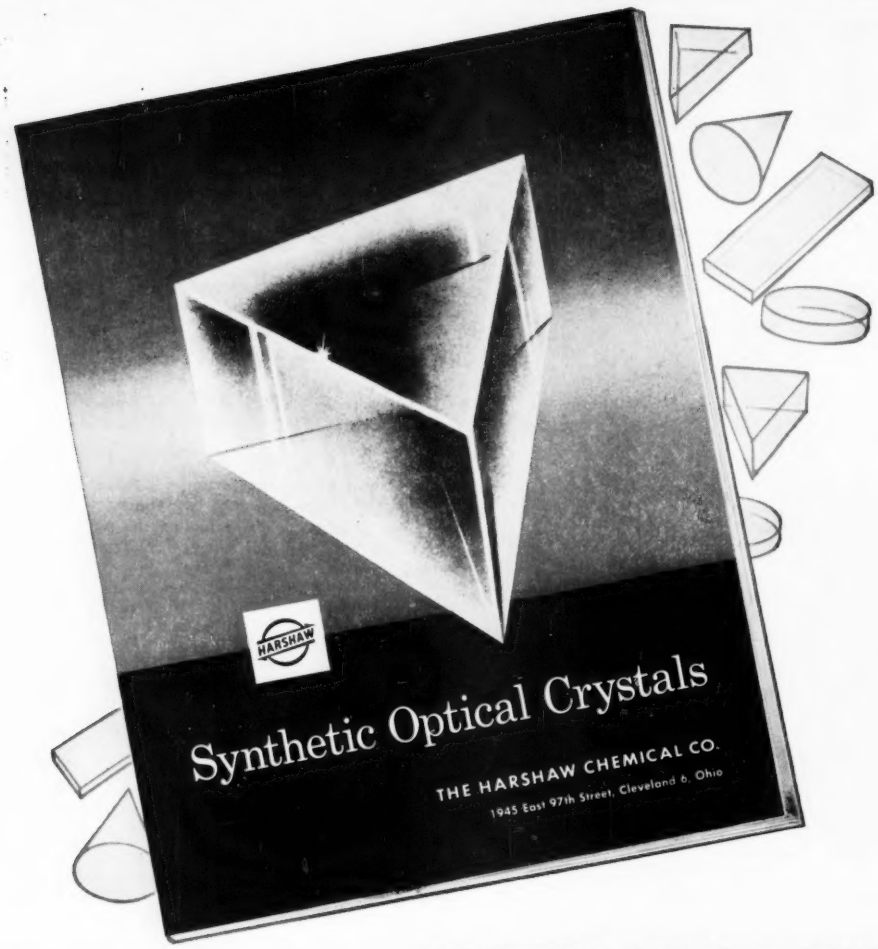
SOUTH AMERICA & ASIA
The Dorr Co.
Stamford, Conn.

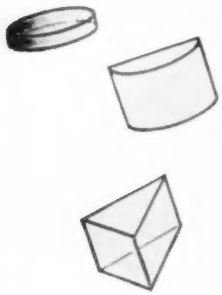
AUSTRALIA
Hobart Duff Pty., Ltd.
Melbourne

SOUTH AFRICA
E. L. Bateman Pty., Ltd.
Johannesburg, Transvaal



the latest information on SYNTHETIC OPTICAL CRYSTALS

(write for your copy)



Contents

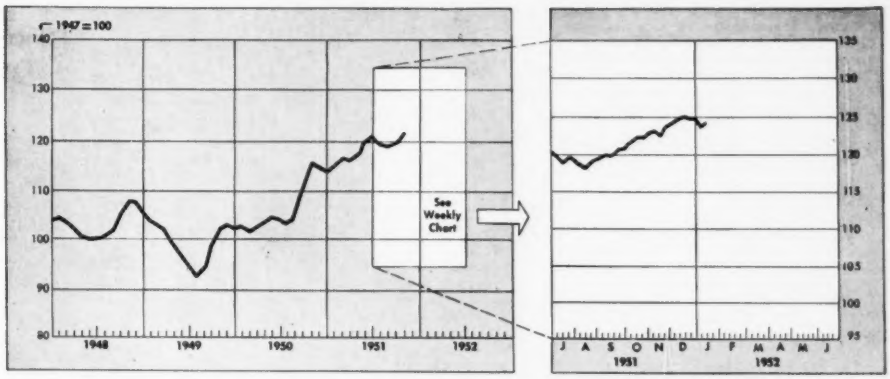
HARSHAW

THE HARSHAW CHEMICAL COMPANY

1945 East 97th Street Cleveland 6, Ohio

BRANCHES IN PRINCIPAL CITIES

MARKETS . . . . . .



CW Index of Chemical Output—Basis: Total Man-Hours Worked in Selected Chemical Industries

This week DPA set another production target: 3.4 million short tons of chlorine annually by 1955. This is a boost of 1.2 million tons within a period of five years.

There is little doubt that chlorine producers will meet the goal without further exhortation. When the now-in-swing program is completed, capacity should be adequate to handle customer demands, and should meet or beat the DPA time-table. Reason for extra speed: Most chlorine is captive, producers know when they will need more, and just go ahead accordingly.

Greater amounts of benzene—and naphthalene—can be looked for from improved coal tar recovery. But increasing supplies in this fashion tacks on an additional processing cost. Result: OPS will allow a higher price ceiling to those who get maximum aromatics recovery. Price of this marginal output will approach that of benzene from petroleum, now more than 10¢/gal. higher than the usual coal tar product.

Vanillin is due to make market news this year. Output will be boosted substantially over the current rate, and competition between the product made from lignin (a wood pulping byproduct) and that made from coal tar-based guiacol will sharpen.

Currently the supply is tight; one major producer allots only 60% even on contracts. But the output growth this year will probably tip the supply balance the other way, could even bring prices down from present levels of around $3 a pound.

New and improved processing, product competition, and rapid changes are of course old-hat in the antibiotics business. In most cases, these have helped bring price levels down to only a fraction of introductory selling prices.

Penicillin is still the largest antibiotic, volume-wise. Output in 1951 exceeded 500 thousand pounds, well ahead of its closest rival. But further expansion will be less mushroom-like than in the past, at least until the market potential can be sized up again.

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Industries Out put Index (1947=100)	125.0	124.5	116.0
Bituminous coal production (daily average, 1000 tons)	1,960.0	1,839.0	1,970.0
Steel ingot production (thousand tons)	2,065.0	2,051.0	1,991.0
Wholesale prices—chemicals and allied products (1926=100)	137.5	137.6	144.9
Stock price index of 14 chemical companies (Standard & Poor's Corp.)	245.1	243.0	215.7
Chemical process industries construction awards (Eng. News-Record)	$6,217,000	$53,940,000	$5,412,000

MONTHLY INDICATORS—Foreign Trade (Million Dollars)	Exports			Imports		
	Latest Month	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
Chemicals, total	90.1	71.1	67.1	20.5	22.2	22.1
Coal tar products	7.8	4.5	4.9	6.8	3.9	3.7
Medicinals and pharmaceuticals	24.5	17.6	21.5	0.6	0.6	0.9
Industrial chemicals	15.2	14.0	9.2	5.3	8.4	10.0
Fertilizer and fertilizer materials	5.8	5.5	3.9	6.7	8.1	6.3
Vegetable oils and fats, inedible	8.3	4.3	4.6	8.7	8.7	9.8

Polyethylene will continue to grow in the next two years. Bakelite Co.'s new plant at South Charleston, W. Va., is rounding into full production, will help push U.S. capacity to around 80 million pounds yearly. And Carbide and Carbon Chemicals, another Union Carbide division, is clearing the decks to make 50 million pounds a year at Texas City by the latter part of next year.

Other important film-making materials currently show some contrasting supply trends. Cellophane will continue to be short until more carbon bisulfide is made available. But the word for vinyl film is "ample."

Only a few weeks ago, NPA listed methyl chloride and methylene chloride among the few critically short chemicals. Now NPA makes a quick about-face by relaxing controls on both—a striking example of how fast a survey can become passé today.

The combination of enlarged facilities and higher efficiency has boosted methyl chloride supply by 500 thousand lbs. monthly, just the amount it was short last June. But by the time requirements for synthetic rubber and fast-growing silicones are met, there will be little left over.

Defense demand for methylene chloride, widely used ingredient in paint removers, has slacked off, making controls no longer necessary. Many of its uses last year were non-recurring; e.g., paint remover formulations and "de-mothballing."

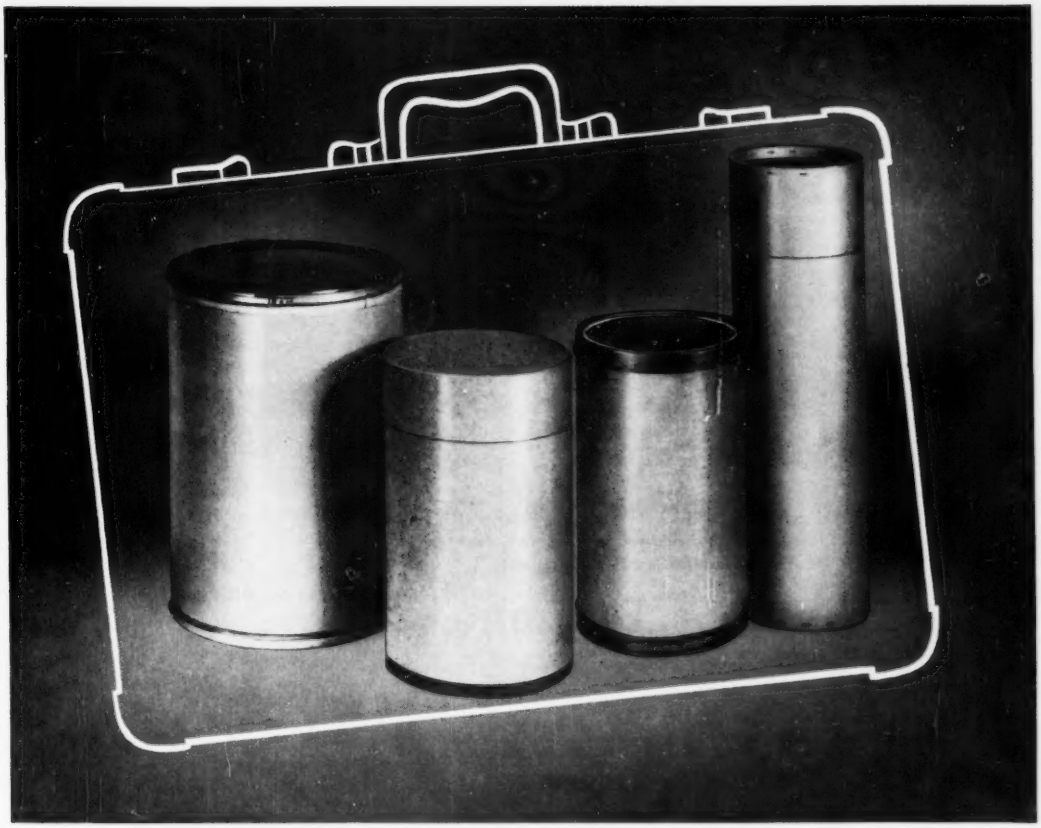
Likewise, getting nylon plastic and bismuth will be less of a problem this year than last. Shortage of production capacity for the plastic has been remedied. Simultaneous levelling off in the bismuth needs of the military, the Atomic Energy Commission, and the stockpile caused NPA to relent on use limitations, though still keeping tabs on inventory.

The supply outlook for fixed nitrogen indicates that ammonia will be tight for about 3 months, then new facilities, including the Morgantown Ordnance Works, will restore the balance. But nitric acid, mostly made from ammonia, will stay short until stainless steel can be had for processing equipment.

SELECTED CHEMICAL MARKET PRICE CHANGES—Week Ending January 21, 1952

	Change	New Price		Change	New Price
UP					
Carnauba Wax, No. 1, yel.	$ .03	$1.20	Tung Oil, imp. tanks	$ .005	$ .405
DOWN					
Copra, cif. Pacific Ports, ton	6.00	162.50	Glycerine, soap lye, 80%	.09	.28
Shellac, No. 1	.035	.495	Red Vermilion, quicksilver, ctn.	.02	3.82

All prices per pound unless quantity is stated



HEAVY PRODUCTS TRAVEL LIGHT IN THESE CONTINENTAL DRUMS

You can't beat Continental fibre drums for shipping economy. Their light tare weight means worthwhile savings at today's high freight costs – even greater savings on export shipments to countries where import duties are levied on the gross weight.

Continental fibre drums are built to stand up under rough handling. They are rugged and durable, give extra protection to both expensive and dangerous articles for shipment across the country or across the world. Closures are tight and strong – but easy to open and easy to close.

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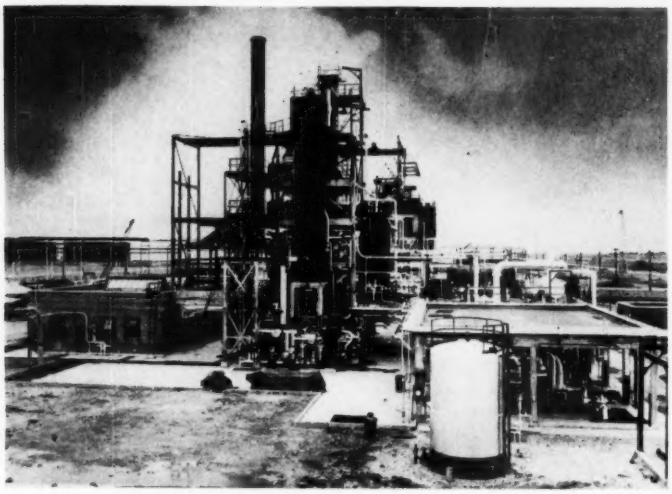

PETROLEUM BENZENE: Costlier, but here to stay.

Slow Pinch for Benzene

Benzene is now easy, but demand for styrene and phenol will put pressure on supplies later this year.

Shortage of materials and lack of building priorities will hamper the expansion of new benzene-from-petroleum.

NPA sees a deficit of 20 million gallons of benzene next year; industry agrees, but timing estimates differ.

The crystal ball that tells of future benzene supply is widely looked at, but few seem to agree on what they see. For example, the National Production Authority currently believes that supply will be some 35 million gallons short of demand this year, and still 20 million gallons short in 1953. This scarcity will develop, according to NPA, despite the fact that new facilities are coming in to make more benzene from petroleum to add to the larger but now inadequate amount made from coal tar.

Coal tar benzene capacity is around 180 million gallons annually, at least 100 million gallons shy of U.S. needs. Sufficient expansion from this source is not feasible—aromatics are only a small phase of the coke oven business. Imported benzene reached 60 million gallons last year, but less is expected from that quarter from now on. The deficit therefore will have to be made up from petroleum sources.

But prevailing opinion among the petroleum refiners is that the shortage isn't as bad as NPA makes out. At least, it won't develop for some time. Benzene, in fact, is rather easy to get, and many of the petroleum people don't look for any real pinch until, say, next fall. On one point, however, agreement is reached: Benzene will be tighter next year.

Big Get Bigger: Expecting a lack of benzene to develop is based on the projected expansions in styrene and phenol, far-and-away the two biggest benzene consumers. To attain NPA goals for these two benzene products, styrene capacity will be boosted by some 200 million pounds annually, and phenol will grow larger by some 150 million pounds. Styrene needed 100 million gallons of benzene in 1951, will take 126 of them this year, and call for 143 in 1953. Phenol took 56 million gallons of benzene last year, is slated to up this amount to 60 this year, and 80, the next. Other benzene-based products are also sure to grow but these two figure to dominate the problem of benzene requirements.

Though styrene and phenol are of prime importance in the mobilization program, new and expanding producers are hampered by lack of priorities in getting materials and equipment. Result: The new plants won't be coming in as fast as hoped for. Since there is almost enough phenol and styrene now being made to meet most defense needs, the new output will be going largely into less essential industries whose needs often exceed their priorities. The upshot of all this is a slower-than-expected increase in output and consequently a later-than-expected need for benzene. Heavy pressure on benzene supply for these uses probably won't be felt until late in the year.

Via Petroleum: To meet the shortage before it develops, NPA and the Petroleum Administration for Defense are doing their best to speed the making of more (and more-costly) benzene from petroleum by hydroforming or platforming. This program has also been plagued by lack of materials; but equally important, most refiners are putting up new facilities simply to cooperate with the government, rather than because they expect to make a profit.

Even with fast tax writeoffs, the payout time for these plants will be longer than usual because of higher plant costs and bigger tax bites. But despite the lack of financial incentives, refiners are bringing in more petroleum benzene capacity as speedily as equipment and other bottlenecks permit. Some companies are already in operation, including Pan-American, Shell Oil, Continental Oil, and Standard of Indiana. Among those due this year: Standard of California, Sun Oil, and another unit for Shell.

Along with these majors will be some relatively small refiners who, using Universal Oil Products' platformers, can operate on a competitive basis. In any case, the price of petroleum benzene will be above coal tar-made material. The current differential averages at least 10¢ a gallon, and this margin is likely to be maintained.

From Now On: But as long as benzene demand continues to grow, the stream of petroleum benzene will broaden. Only 25 million gallons were turned out last year; yet within two years, output from this source should reach 147 million gallons a year. NPA has already certified capacity for 133 million gallons annually, with two additional certificates now pending.

Though many refiners aren't too keen about making benzene by a higher-cost process, they are well aware that most of this production will fill a permanent need of the U.S. chemical industry, whatever the turn of future events. Fortunately, chances of overproduction are slim; for if conditions warrant, these units can be switched over to making gasoline.

Quicksilver Quirk

Makers of mercurial compounds have crossed their fingers hoping that further increases in mercury costs won't price their products out of the market. At present, however, producers are absorbing higher costs because supplies are more than adequate to meet demands.

The mercurial business is transacted by U.S. importers of the metal, who are at the mercy of foreign producers pricewise. Producers in Spain and Italy, the main sources, set prices as high as the market will bear but yet not so high that marginal U.S. mines return to operation.

The variation that this brings to mercury prices—and normally to mercury compounds—has frequently resulted in buyers turning to substitute and alternate materials where they can.

Paint makers, for example, who used to pay $2.60 per pound for mercuric oxide used in antifouling and marine paint, now have to shell out $4.15. Compared to this 55% increase, the price of a 76 lb. flask of mercury jumped from $70 to $208, an almost 200% rise. Buyers don't like the 55% jump; sellers who are interested in cultivating long-term markets don't like either one.

Big Four: The oxides used in antifouling and other specialty paints are among the handful of quicksilver compounds significant from a volume standpoint. These include both red and yellow mercuric oxides (which differ in production processes, resultant particle size), mercuric chloride (corrosive sublimate), and mercurous chloride (calomel), which is used on a somewhat smaller scale than the others. In war time, mercury fulminate is also significant.

At present, production of organic mercurials can't begin to compare with inorganics, but output is moving up steadily. One reason for this increase is the popularity of phenylmercuric acetate as a crabgrass killer (*CW, Aug. 25, '51*). Only cloud on this horizon is the danger of misuse. As one manufacturer put it: "If crabgrass treating were done by full-time custom sprayers, I'd see a brighter future." This use, in any case, will change the future distribution pattern.

Made and Paid: The specter of oversupply hanging over manufacturers has deterred such price rises that are allowed to those who have filed under CPR-22. And with the price of mercury free to climb, it looks like makers of mercurials will have to operate on still smaller margins until the price comes down.

GOVERNMENT NEEDS

Bid Closing	Invitation No.	Quantity	Item
Regional Information Officer, Region 3, General Services Administration, Washington 25, D.C.:			
Jan. 29	2M-6450-R	1,675 lb	Insecticide DDT powder, technical
Jan. 28	2W-6449-R	25,000 lb	Sodium carbonate, photographic use
Navy Purchasing Office, 111 East 16th Street, New York, N.Y.:			
Feb. 6	121-B	2,000 gal	Compound, grease cleaning
Feb. 7	117-B	7,400 lb	Cleanser, hand
Feb. 13	118-B	315,000 lb	Calcium chloride

GOVERNMENT AWARDS

Item	Supplier	Location
Armed Services Petroleum Purchasing Agency, Washington 25, D.C.:		
Jet fuel	Standard Oil Co.	San Francisco, Calif.
Solvent & paint thinner	Amer. Mineral Spirits Co.	New York, N.Y.
Solvent & paint thinner	Anderson Prichard Oil Corp.	Oklahoma City, Oklahoma
Solvent & paint thinner	Armour Oil Co.	San Diego, Calif.
Solvent & paint thinner	Bell Oil & Gas Co.	Tulsa, Oklahoma
Solvent & paint thinner	The R. J. Brown Co.	St. Louis, Mo.
Solvent & paint thinner	Phipps Products Corp.	Boston, Mass.
Aviation Supply Office, 700 Robbins Ave., Philadelphia 11, Pennsylvania:		
Pigment, dry	Amer. Zinc Sales Co.	Columbus, Ohio
Trichlorethylene	Niagara Alkali Co.	New York, N.Y.
Corps of Engineers, U.S. Army, Chicago Procurement Office, 226 West Jackson Blvd., Chicago, Ill.:		
Superphosphate	Nylos Trading Co., Inc.	New York, N.Y.
Superphosphate	J. R. Simplot D.B.A., Simplot Fertilizer Co.	Pocatello, Idaho
Superphosphate	Stauffer Chemical Co.	San Francisco, Calif.
Calcium ammonium nitrate	Comptoir Belge De l'Azote "Cobelaz"	Brussels, Belgium
Headquarters, Air Materiel Command, Dayton, Ohio:		
Methylene chloride and naphtha	Farbach Chemical Co.	Cincinnati, Ohio

tracers...

MANAGEMENT SERVICES

EMPLOYMENT

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

EQUIPMENT—used-surplus

For Sale

Autoclave, 1 gal., glass lined, 500# Pr., D direct fired. Perry Equip. 1415 N. 6th St., Phila. 22, Pa.

Centrifugal, 36"x40", Bird, Continuous, Consolidated Products, 14-18 Park Row, N.Y. 38, N.Y.

Centrifugal, Sharples S/S Super D Canter. R. Gelb & Sons, Inc., St. Hwy. #29, Union, N. J.

Column, Steel Bubblecap, 21" diam., 20 plates 7" Sp. Arthur Proc. Equip. Co., 29 B'way, NYC.

Crusher, American Ring Roll sz 2400; 50 H.P. mtr. First Mach. Corp. 157 Hudson St., NY 13.

Dryer, Buffalo Vacuum 20 shelf; 40"x44" Complete with all accessories. First Machinery Corp., 157 Hudson St., N.Y. 13, N.Y.

Dryer, J. P. Devine Vac. Shelf, 39"x42", 9 Slvs. R. Gelb & Sons, Inc., St. Hwy. #29, Union, NJ

Dryer, Vacuum Shelf Dryer, MD Pumps, 3 HP motor. Eagle Indus. 110 Washington St., NYC.

Dryers, 1 11'6" Roto-Louvre. Brill Equip. Co., 2401 Third Avenue, N.Y. 51, N.Y.

Filter, Alsop S.S. 8x10 w/pump and motor. Mach. Ex., 131 Thompson St., NYC GR 7-3044.

Filter, 4'6" x 6' Feinc Rotary Vacuum, Alum. Perry Equip., 1415 N. 6th St., Phila. 22, Pa.

Filter, Cellulo, S/S #8B with pump & mtr. L. E. Glick & Co., Cincinnati 2, Ohio.

Filter, Niagara #200 S/S leaves. R. Gelb & Sons, Inc., State Hwy. #329, Union, N.J.

Filter, Sweetland #5, 29 leaves. Perry Equip., 1415 N. 6th St., Phila. 22, Pa.

Filters, 2 #7 Sweetland, 27 leaves. Brill Equipment Co., 2401 Third Av., N.Y. 51, N.Y.

Filter Press, 24"x24", aluminum, 24 chambers, Consolidated Prods., 14-18 Park Row, N.Y. 38.

EQUIPMENT—used-surplus

For Sale

Filter Press, 30"x30", iron, Sperry, steam heated, 30 chambers, Consolidated Products. 14-18 Park Row, N.Y. 38, N.Y., Barclay 7-0600.

Filter Press, Shriver Wooden Plt. & Frame, 42"x42", 38 Chamb. R. Gelb, Inc., St. Hwy. #29, Union, N.J.

Filter Press, Sperry Heresite, 36"x36", 17 Cham. R. Gelb & Sons, Inc., St. Hwy. #29, Union, NJ

Filter Presses, all sizes and types. Process In-dustries, 305 Powell St., Brooklyn 12, N.Y.

Kettles, 20-380 Gals. Cap., Stainless. R. Gelb & Sons, Inc., St. Hwy. #29, Union, N.J.

Mill, Rubber, New 6x12", 2-rolls, Johnson Joints, 5 HP motor complete. Eagle Industries, 110 Washington St., N.Y.C.

Mixer, 110 gal. stainless Patterson Vacuum, Consolidated Prods., 14-18 Park Row, N.Y. 38.

Mixer, Lab BP Vacuum, 17 gal. Jktd. MD, complete. Eagle Industries, 110 Washington St.,NYC

Mixer, 200 gallon B.P. Jacketed, m.d., Con-solidated Products, 14-18 Park Row, N.Y. 38.

Mixer, Reed 225 Gals. S/S, Sigma Blades. R. Gelb & Sons, Inc., St. Hwy. #29, Union, N.J.

Pebble Mills; 8'x8', Porcelain lined with 50 HP gear motor. First Machinery Corp., 157 Hudson St., N.Y. 13, N.Y.

Pulverizers; Mikro #2 & 4; also Raymond No. "00". Robinson No. 4 Hammermill with 60 HP. First Machinery Corp., 157 Hudson St., N.Y. 13.

Pulverizer, Mikro #1-SH & #2-TH. R. Gelb & Sons, Inc., State Hwy. #29, Union, N.J.

Pulverizer, Raymond High Side 5 roll, Consoli-dated Products, 14-18 Park Row, N.Y. 38, N.Y.

Pulverizers, 1-3 Roll Raymond Hi Side Roller Mill, oil journals, all accessories. Brill Equip-ment Co., 2401 Third Ave., N.Y. 51, N.Y.

Pump, 1 Amer. 4"x3", 2 stg. hi hd., 500 GPM 300 ft. hd. 50 H.P. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

Pump, 2 Centr., Amer. high hd., 2 stg. 4"x3" 500 GPM at 290' hd. 50 H.P. Luria Bros., Lin-coln Liberty Bldg., Phila. 7, Pa.

Pump, 1 Centr., Amer. 5" suction, 4" discharge, 2 stg., Type BE, 750 GPM at 400' hd. 100 H.P. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

Pump, 2 Centr., Amer. 5x. 5" suction, 4" disc. 2 stg., 1760 RPM, Cap. 750 GPM at 400 hd. 125 H.P. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

Pump, 2 Centr., Gorman-Rupp, Mod. 1223, 5x 2, 2" discharge, 2" suction, 186 GPM/10' hd. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

Pump, 7 Cent., Gorman-Rupp, 3", Mod. 332 (E-13) 325 GPM/10' hd. 5 H.P. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

Pump, 1 Centr., Gorman-Rupp, Mod. B14A, Sz 4" 750 GPM/10' hd. 25 H.P. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

Pump, 2 Centr., I-R, Type 2 MRV-40, 250 GPM at 400' hd. 40 H.P. Luria Bros.., Lin-coln Liberty Bldg., Phila. 7, Pa.

Pump, 2 Centr., Weinman, K25-2, Type K, sgle stg. close cpld. Unipump, 3" suction, 2½" disc. 300 GPM/215 ft. hd. 25 H.P. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

Pump, 2 Centr., Weinman JC, 2 stg cap 500 GPM/400' hd., 5" suction, 3" disc., at 3,450 RPM, 75 H.P. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

Pump, 2 Deep Well, Deming, Turbine, 33 GPM against 40# discharge press. at hd. 2 H.P. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

Pump, 1 I-R Size 1½ MVR 25, 100 GPM, 520' hd. 25 H.P. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

EQUIPMENT—used-surplus

For Sale

Pump, 1 I-R, Mod. A, 1740 RPM, 200 GPM/96' hd. 7½ H.P. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

Pump, 1 I-R, 2 stg. 50 HP, Mod A 235 GPM-500' hd. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

Pump, 1 I-R Mod, 2 MRV-40, 2 stg 3450 RPM, 250 GPM/320 ft. hd. 40 H.P. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

Pump, 5 I-R. Mod. 4GT2 Cap 1000 GPM at 1000 ft. head. 350 H.P. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

Pump, 2 Multi-stage, Worthington, Mod 4 UR-1, 500 GPM at 1800 ft. hd. 350 H.P. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

Pump, 1 Worthington, Mod. 1½ UI with 10 H.P. motor. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

Pump, 1 Worthington, 4", Mod 4 UQ-1, 500 GPM/1000' hd. 200 H.P. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

Pump, 3 Worthington, Recip Power Pumps, Sz 4¼x10 M, 100 H.P. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

Pump, 1 Worthington, Recip. Power, Size 6 x 10 M, 200 H.P. Luria Bros., Lincoln Liberty Bldg., Phila. 7, Pa.

Screen, Orville Simpson Rotex Mod. #42. R. Gelb & Sons, Inc., St. Hwy. #29, Union, N.J.

Still, 500 Gal., Steel, Vac. & Agit., Jktd., 125#. Arthur Process Equip. Co., 29 B'way, N.Y.C.

Tablet Press, Stokes DD2, 23 punch, Consoli-dated Products, 14-18 Park Row, N.Y. 38, N.Y.

Tank. New 20,000 Gal. Cap. 5/16 Steel 6 avail-able. L. M. Stanhope, Rosemont, Pa.

Tank, 5700 gal., S/S, Horizontal. New Perry Equipment, 1415 N. 6th St., Phila. 22, Pa.

Tanks, S.S. from 250-3500 gal. jktd. MD, Agit. Eagle Industries, 110 Washington St., N.Y.C.

Tanks, S.S. Storage & Mixing, all capacities. Process Industries, 305 Powell St., B'klyn 12.

Tanks, Steel, 4000 to 25,000 gal. L. E. Glick & Co., 626 Broadway, Cincinnati 2, Ohio.

Tanks, 1500 Gals., 316 S/S. R. Gelb & Sons, Inc., State Highway 29, Union, New Jersey.

Tanks, 25-Steel, 8000 gals. to 16,000 gals. R. Gelb & Sons, Inc., St. Hwy. #29, Union, NJ.

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Bottles. Excess inventory of Bottles & caps of whatever type available. United Bottle Supply Corp., 27-50 1st St., L. I. City 2, N.Y.

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BOOKLETS . . . .

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*84-p. manual devoted to the firm's powders and pastes, introduces its subject by outlining the development of aluminum powders from antiquity to present day, with reference to three modern production methods utilized by one of the firm's plants. Reviewed here are characteristics, methods of control and testing, recommendations for handling and use as well as diverse applications for the powders and pastes, which are covered in individual chapters headed paints and coatings, pyrotechnics, heat reactions, chemical processing, powder metallurgy, etc. Reynolds Metals Co.

Carbonyl Iron Powders

32-p. booklet giving basic information on the production, applications and performance of carbonyl iron powders—microscopic, spherical particles consisting of pure iron, which find primary application in the field of electronics, in addition to uses as alloying agents, catalysts, pharmaceuticals, in magnetic fluids and in powder metallurgy. Photomicrographs, charts, graphs, tables and mathematical formulas supplement the textual data given. General Dyestuff Corp.

Medicinal Chemicals

Price catalog listing its line of medicinal chemicals including for the first time a new topical anesthetic, an antihistamine intermediate and six other medicinal chemicals. Gane and Ingram, Inc.

Silicated Detergent

4-p. bulletin reviewing the properties of a silicated detergent designed for washing heavily soiled loads, and noting its major advantages and specific directions for its use. Diamond Alkali Co.

Equipment

Spectrometric Equipment

60-p. catalog entitled, "X-ray Diffraction and Geiger-Counter X-Ray Spectrometric Equipment," covering in addition to X-ray diffraction, spectrometry and fluorescence analysis such components and accessories as tubes, rectifiers and cameras. For the equipment described, the booklet gives details on specifications, construction data, operation, and applications in industry; various charts amplify application data. North American Philips Co., Inc.

Dust Collectors

36-p. catalog describing various sizes and models of cloth-type dust collectors as to the advantages to be gained from cloth filtration and specifications, along with construction drawings, cut-away views and illustrations of typical installations. Cotton, wool, and synthetic types of dust collectors as well as the continuous automatic collectors are covered. American Wheelbrator & Equipment Corp.

Adjustable Port Valves

12-p. bulletin discussing the specifications, mounting dimensions, material specifications, maximum pressures and other details concerning the firm's adjustable port valves for use with "Air-O-Motor" diaphragm operators as valves utilized in gas, air, oil, steam and water regulation. Minneapolis-Honeywell Regulator Co.

Centrifugal Pumps

12-p. catalog covering the firm's line of pumps — those for handling corrosive liquids, centrifugal process pumps, monobloc pumps, refinery types, and elbow propeller pumps; particular function, capacities, materials of construction and sizes are noted for each of the various pumps. Other products noted include valves, ejectors, mechanical seals and "Worthite," a high-nickel, high-chromium, molybdenum alloy steel which is used in much of the company's equipment. Worthington Pump and Machinery Corp.

Valve and Flange Covers

Bulletin giving details on "ChemKovers," covers for valves and flanges designed to provide protection against leakage without hindering normal operation. The covers are made of Dynel, a staple fabric resistant to acids and caustics and not supporting combustion. Mine Safety Appliances Co.

Portable Gas Cutting Machine

8-p. bulletin featuring the firm's No. 20 Radiagraph, a portable gas cutting machine. Details concerning its construction, specific applications, controls, and specifications are included in the bulletin. Air Reduction Co.

* Request must be made direct to company on business letterhead.

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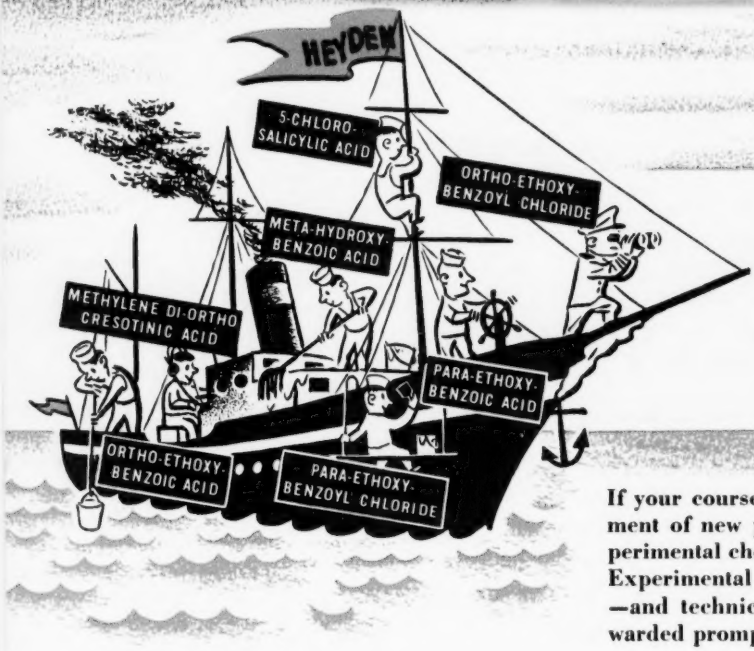

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Solubility . Very slightly soluble in cold water; soluble in hot water and alcohol.

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A dibasic acid useful in the production of resins for surface coatings and printing inks. Intermediate for dyes and fine chemicals.

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Solubility . Slightly soluble in cold water; Soluble in hot water.

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Highly reactive intermediate for preparation of esters, amides, etc.

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Solubility . Very slightly soluble in hot water.

PARA-ETHOXYBENZOYL CHLORIDE

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